WIRE AND WIRE PRODUCTS

FEBRUARY ★ 1952

SYNCRO

Machinery for the Wire Industry

SYNCRO MACHINE COMPANY · PERTH AMBOY · NEW JERSEY · U.S.A.

WIRE DRAWING MACHINES

STRANDERS

TAPING MACHINES · DIE STRINGERS

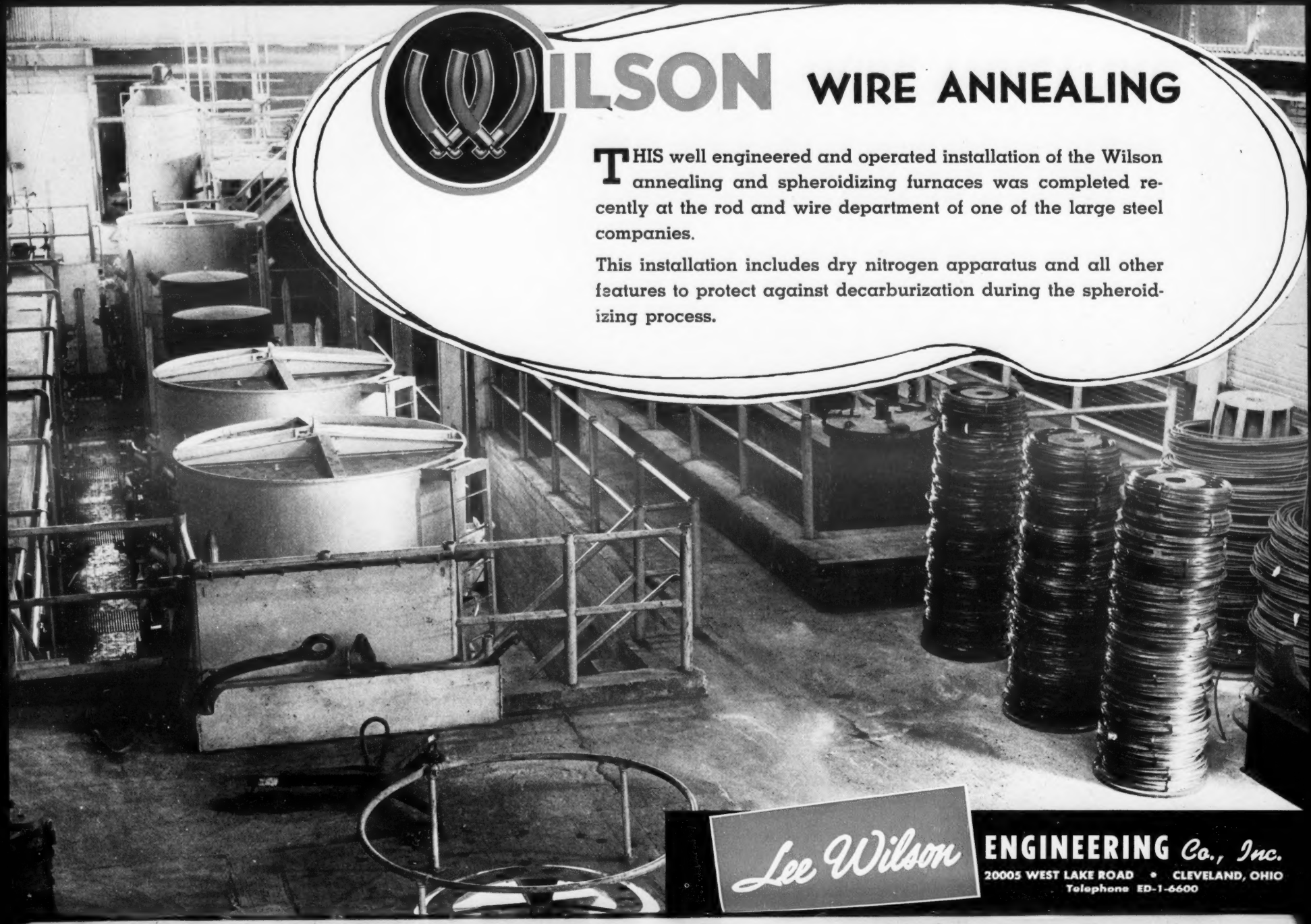
PAYOFFS · CAPSTANS

CONTINUOUS ELECTRIC ANNEALERS

WIRE INSULATORS · HEAVY DUTY TAKEUPS

can help you to profitably meet 1952's predicted increase in defense production

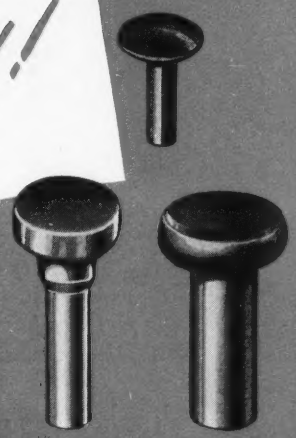
FICIAL PUBLICATION OF THE WIRE ASSOCIATION


WILSON WIRE ANNEALING
THIS well engineered and operated installation of the Wilson annealing and spheroidizing furnaces was completed recently at the rod and wire department of one of the large steel companies.
This installation includes dry nitrogen apparatus and all other features to protect against decarburization during the spheroidizing process.
Lee Wilson ENGINEERING Co., Inc.
20005 WEST LAKE ROAD • CLEVELAND, OHIO
Telephone ED-1-6600

PRODUCTION-PROVED

TO GIVE

GREATER MILL EFFICIENCY!



Firthaloy

COLD HEADING DIES

bring real savings to Bolt, Rivet and Screw Manufacturers because they assure:

- **Accurate Fit** . . . tolerances can be held closer on longer production runs.
- **Less Wear** . . . which eliminates excess material on blanks, and increases the life of thread-roller dies.
- **Longer Life** . . . delays bell mouth formation and reduces idle machine time and waste.

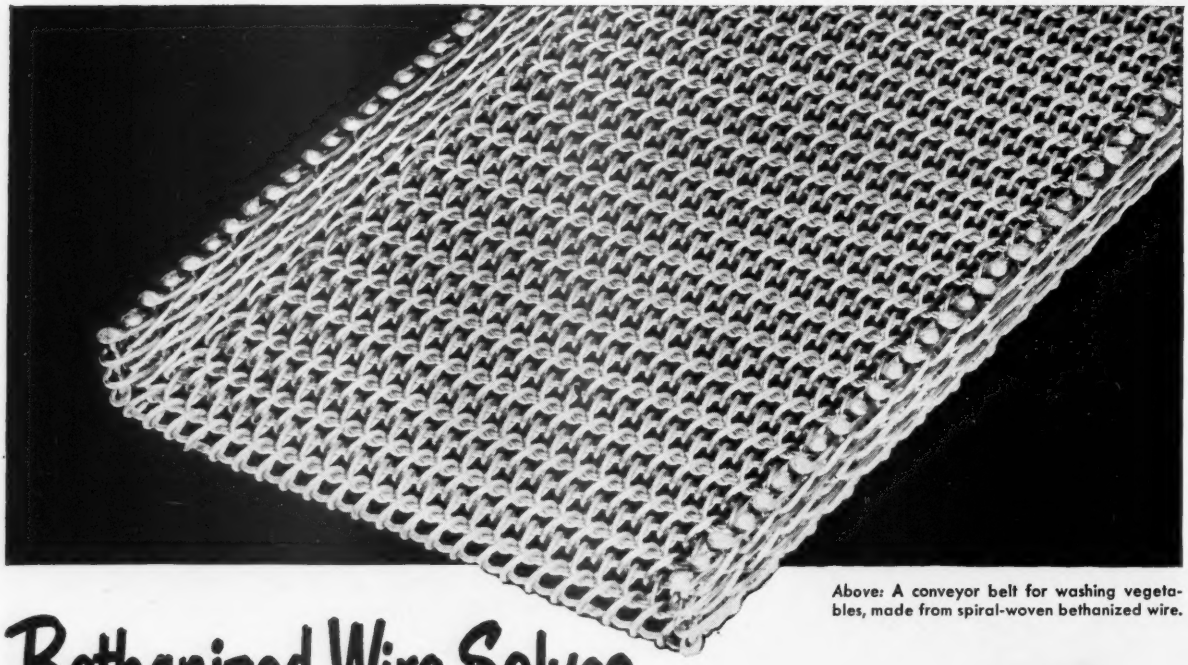
R-258

Firth Sterling

STEEL AND CARBIDE CORPORATION

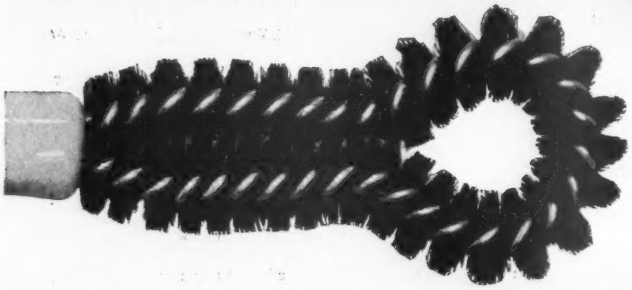
3113 FORBES STREET • PITTSBURGH 30, PA.

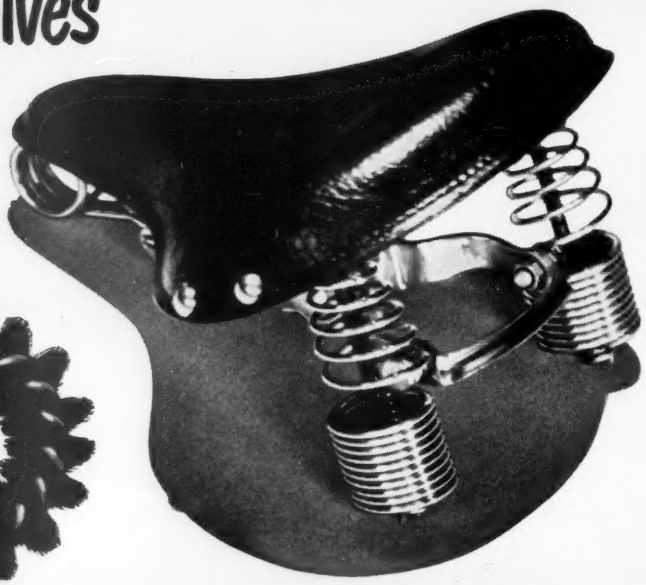
Offices and Warehouses:* NEW YORK* CHICAGO PITTSBURGH* DETROIT DAYTON* CLEVELAND HARTFORD PHILADELPHIA* LOS ANGELES BIRMINGHAM*



Above: A conveyor belt for washing vegetables, made from spiral-woven bethanized wire.

Bethanized Wire Solves Forming and Corrosion Problems





More and more manufacturers, whether they make chain-link fence or brush handles, are recognizing the value and versatility of bethanized wire.

We're picturing here just a few of the tough assignments in which bethanized wire is doing a good job. Each application requires a corrosion-resistant coating and an ability to withstand severe forming.

In each case the bethanized coating is meeting every requirement. The pure, ductile zinc armor comes through the forming operations without cracking, flaking or peeling off. It's a smooth, uniform coating that can take a lot of punishment and still fight off rust.

Whether you need hard- or soft-temper wire, standard or heavy zinc coatings, we'd like to show you how bethanized wire can add sales appeal to your products. The nearest Bethlehem sales office will give prompt attention to your request for facts.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

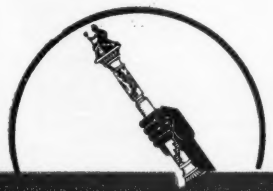
THE PATHFINDER

A straight through non-slip machine of advanced design

Special 4/5 Block Pathfinder Type 22/40 for drawing mild steel from 5 s.w.g. at speeds up to 2,250 feet per minute.

1. The wire passes straight through the machine from block to block. The block speeds are automatically regulated by our patented electrical gear. Wire tension between blocks can be independently set.
2. Tilted blocks enable sufficient wire to be accumulated on each block to allow for ample cooling and yet pass through the die to the bottom of the following block in a straight line.
3. Almost infinite drafting can be obtained at each die.
4. The machine is ideal for use with a heavy spooler carrying up to about two tons of finished wire.
5. Owing to the absence of all guide pulleys, multi-holing from very heavy inlets is perfectly feasible.
6. A standard FIVE BLOCK Heavy machine is available for high carbon with the following specification:

	Type 30/60
Block Diameter.	30"
Maximum inlet.	.500"
Finish.	.250"—.102"
Drawing Speeds.	600—1200 feet per minute.



MARSHALL RICHARDS MACHINE CO. INC.
1100 SOUTH BROAD STREET · TRENTON 10 · NEW JERSEY

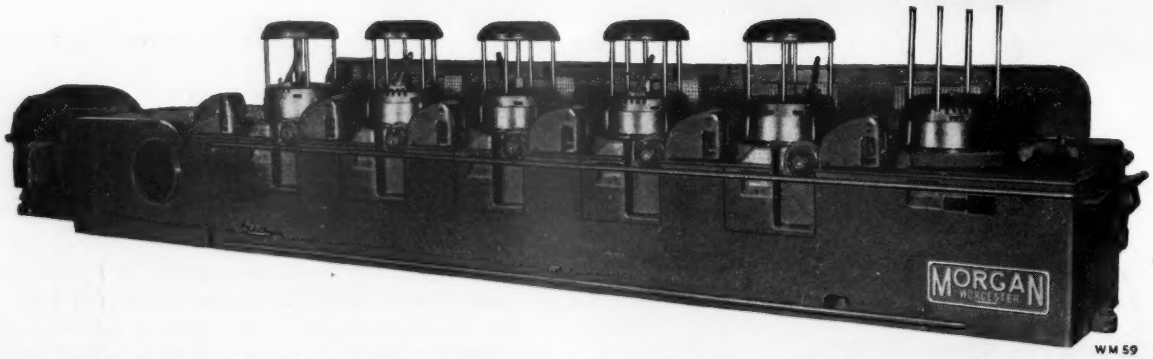
MR50

PRODUCTION *looming*

...but what about the costs?

There comes a time in the life of a machine when efficiency begins to drop and costs begin to rise . . . a time when a machine has run its course profitwise.

Under present high production schedules old machines can quickly mean the loss of a lot of money. A machine-by-machine study will spotlight the wastrels. May we help you make such a study?



WM 59

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ROLLING MILLS · MORGOIL BEARINGS · REGENERATIVE FURNACE CONTROLS · AIR EJECTORS · PRODUCER GAS MACHINES

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 27 FEBRUARY, 1952 No. 2

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Contents

Editor's Desk 147

Beryllium Copper Wire: Its Processing and Uses Part I by John T. Richards 149

Production of Springs by Statistical Quality Control by Edward E. Franks, Jr. 156

Making Satisfactory Welded Joints in Wire by Resistance Welding by the Technical Staff of The Taylor-Winfield Corporation 161

Standard Costs in Wire Cloth Manufacture by W. S. Hilderbrand 164

The Gilbert and Bennett Story 167

Government Wire Production Information 170

Outstanding Personalities of the Wire Industry 178

A Review of Recent Wire Patents 185

Index to Advertisers 215

Where-to-Buy 216-220

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NILES

FLANGED STEEL TRAVERSES

. . . offer wire rope users and manufacturers rugged construction, simple 4-step reel assembly and long life—the same qualities that have made them first choice of thousands for wire and cable reels.

Niles Flanged Steel Traverses are manufactured in a wide range of sizes up to 56" diameter and 48" traverse... in plain, painted and hot dip galvanized finishes. The special "Reinforced Type" has *extra strength* where it is needed most—at bolt holes and base of the flange—yet saves weight through use of lighter gauge steel. Width of flange and number of bolt and drain holes are furnished to your specifications. Available for prompt delivery. Write for prices.

• • •

Manufactured Under License Arrangements With Western Electric Co., Inc.

REPUBLIC STEEL

NILES STEEL PRODUCTS DIVISION

REPUBLIC STEEL CORPORATION

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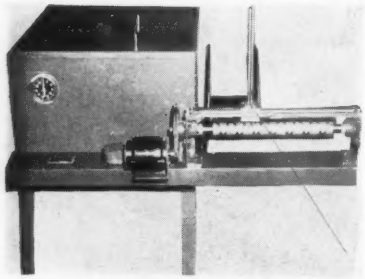
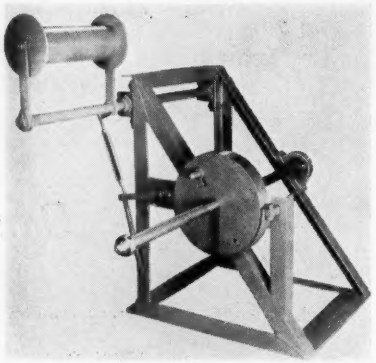
DAVIS EQUIPMENT
FOR ELECTRIC WIRE AND CABLE

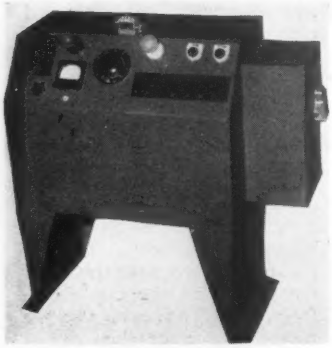


1. Davis Takeup or Reeler engineered specially for spooling covered wire at speeds up to 1,000 feet per minute. Equipped with Davis' automatic traverse and automatic tension, and wire speed indicator for reels up to 30" diameter.

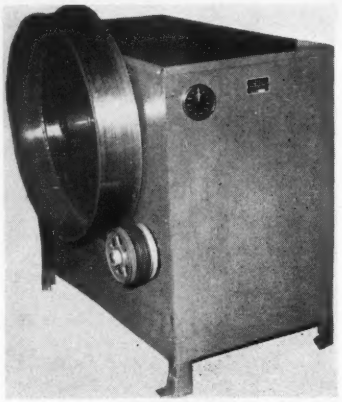
5. Davis Measuring Machine. Adjustable for wire or cable up to 1½" in diameter. Equipped with two knurled wheels to prevent slippage. Speeds up to 2,000 feet per minute.



2. Davis rugged Reel Stands are built for reels up to 30" in diameter. All Davis Reel Stands are equipped with ball bearings, feeder rolls, and automatic tension brakes.



3. The famous Davis Spark Tester unit for use in locating current leak in covered wire. Usually located between Capstan and Takeup, but can also be used during a rewinding operation. Warning light or horn informs operator of breaks in covering.



4. Capstan designed and built by Davis especially for drawing covered wire from extruders. Variable speed drive and adjustment for wire speeds up to 1,000 feet per minute. Transfer pulley and speed indicator included with Davis Capstan.

Any equipment will be specially engineered and built for you to fit your particular needs. Let this new and progressive organization demonstrate to you what fast, competent and courteous service can mean. All orders will be given definite shipping dates that will be adhered to. The DAVIS policy of low prices will be continued.

Write today for detailed information!

DAVIS EQUIPMENT

DAVIS ELECTRIC CO. • WALLINGFORD, CONN.

Successors To The R. L. Davis Electric Co., Inc.

HARNESS TESTERS • PAY-OFFS • TRAVERSES

SPARK TESTERS • SPOOLERS • TAKE-UPS

EXTENSION OF DIE LIFE
ELIMINATION OF SULL-COATING
PROTECTION AGAINST RUSTING
LOWER COST PER TON OF WIRE DRAWN
FOLLOW-THRU AT HIGH SPEEDS
--- BRIGHTER SURFACES

These are the results you can chalk up by putting the team of Magnus Metalcoat 267 and Magnus Dri-Draw 400 to work in your mill in '52.

Magnus Metalcoat 267 eliminates the need for lime coating and baking and gives protection against rusting. Magnus Dri-Draw 400 provides an unusually tenacious, strong film that insures high speed production at minimum cost, no matter how hard the draw.

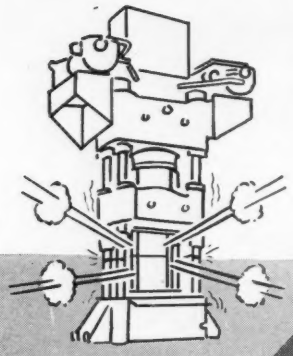
Used together, these two Magnus Products can give you the increased production—extra tonnage—that you'll want this year. Why not look into the Magnus Method now.

Although Magnus Products for wire mills have been substantially reduced in price, there has been no sacrifice of high quality.

Wire Drawing Division
MAGNUS CHEMICAL CO., INC.
South Avenue Garwood, N. J.

Magnus

CLEANERS • EQUIPMENT • METHODS



Tough draws are easy with Talide Dies

● As a production man, you know of the trouble-free, phenomenal results with Talide Carbide Dies on runs up to a million or more pieces. Long, uninterrupted service life—20 to 50 times greater—makes Talide Dies less expensive than steel dies. Many draws today would be impossible without carbide dies. Pickup, scoring or scratching is eliminated.

A lustrous surface finish results, adding greater sales appeal to your product.

Whether your problem involves a deep draw, tough draw, or a heavy draw—they are all easier with Talide Dies.

You can obtain Talide Dies in sizes from pinpoint to 24" diameter and in many complex shapes.

SEND FOR DIE CATALOG 50-G

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SINTERED CARBIDES • HOT PRESSED CARBIDES

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OVER 25 YEARS EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

FLAT SPRING STEEL

No more waiting! Roebling's expanded facilities can meet your needs right now!

PROMPT! FAST! . . . that's the sort of deliveries you can count on now for Roebling high carbon flat mechanical spring steel. For many years Roebling has had one of the largest specialty mills in the country and today's expanded facilities have boosted production to new highs.

Roebling flat spring steel is made as you want it . . . annealed, hard rolled untempered; scaleless tempered; tempered and polished, blue or strawed. And from open hearth to finished product, Roebling positive control assures uniform quality . . . saves preparation time for users . . . brings faster, smoother production.

Roebling is ready to furnish flat spring steel with the exact mechanical properties required for any special type of application. Write or wire now for full information. John A. Roebling's Sons Company, Trenton 2, New Jersey.

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Here's a New ACROPAK* Spool in the SIZE you've wanted for Years!

Light-weight drawn aluminum — Designed especially for fine wire packaging.

2½" and 3" sizes

Look what it gives you!

Light weight—strength—durability! Reduced cost—longer life—less maintenance! Drawn aluminum alloy construction assures less weight (and lower freight costs) with exceptional rigidity. Flanges will not toe out under pressure. Absolute assurance of uniform delivery over head of spool with minimum end breakage. Brilliant, sparkling sales-appeal that improves the appearance of your package. Get the facts on this new 2½" and 3" ACROPAK.

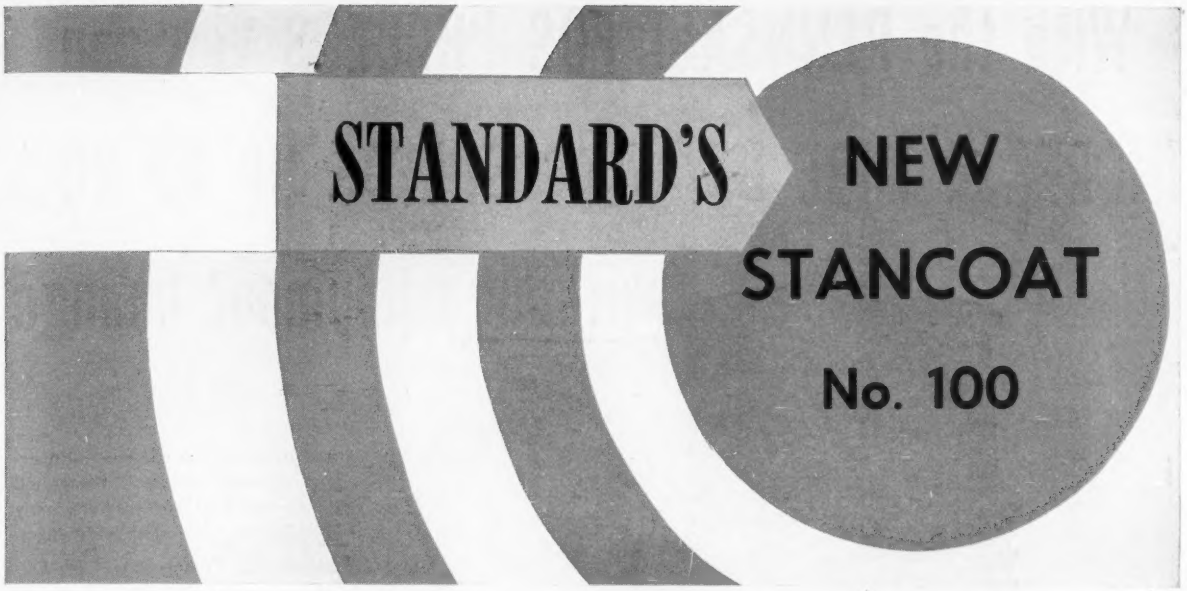
SPECIFICATIONS

Flange	Traverse	Barrel	Arbor
2½"	3"	1¾"	.635"
3"	3" - 3¼" - 3½"	1¾"	.635"
3"	3" - 3¼" - 3½"	2"	.635"

*Reg. U. S. Trade Mark

ACROMETAL PRODUCTS INC.

Division U. S. Bobbin and Shuttle Co., 616 Fifth Street N., Minneapolis 1, Minn.



A NEW COATING

FOR WET DRAWING HIGH AND LOW CARBON WIRE

You can substitute this coating for liquor finish where copper or liquor finish color are not required. STANCOAT No. 100 compound is suitable for:

FINE ROPE WIRE, WEAVING WIRE, WIRE TO BE GALVANIZED, ETC.

This is an acid coating. It makes a chemical, metallic bond, plus a physical bond to act as a carrier. It is easy to control. Cost of coating considerably less than liquor finish.

Consult your Standard representative at once, or write direct.

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STANDARD INDUSTRIAL COMPOUNDS COMPANY has pioneered most of the outstanding contributions to better wire drawing through better lubricants. Consult with STANDARD for the solution of your difficult problems. We welcome your inquiries.

wire drawing lubricants *Standard* INDUSTRIAL COMPOUNDS CO., INC.

4600 WEST FERDINAND STREET
CHICAGO 44, ILLINOIS

With the PENNSALT FOS PROCESS you can INCREASE WIRE DRAWING SPEEDS UP TO 80% without equipment change

Note difference in appearance between wire drawn by conventional lime practice (top), and wire drawn by the new Pennsalt Fos Process. The Fos-coated wire was drawn at speeds resulting in a 40% increase in production. Despite this speed-up, die life was increased 2½ times.

A series of tests under actual commercial operating conditions has conclusively demonstrated that the new Pennsalt Fos Process offers many production-boosting, cost-lowering advantages.

With the Pennsalt Fos Process actual production can be increased more than 40% . . . in fact wire drawing speeds are now limited only by the mechanical capacities of the drawing machines. Speed increases of 80% are entirely possible.

In addition, you can often triple die life and eliminate high temperature baking operations. With this new Pennsalt Fos Process you can get more consistent drawing results and far greater corrosion resistance, as well as a truly finished appearance without subsequent operations . . . *all without equipment or process flow changes!*

The new Pennsalt Fos Process consists of compatible cleaning, pickling and the application of a new phosphate coating, together with specially-developed lubricants. This produces a heat-resistant surface that remains unbroken even under the most severe forming pressures.

Investigate Pennsalt Fos Process. Write about your operation on your letterhead and we will tell you how the Pennsalt Fos Process can speed your output and probably lower your costs. Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

Fos Process works equally well for tube drawing, deep drawing and cold heading, as well as for ordnance work.

PENNSALT CHEMICALS

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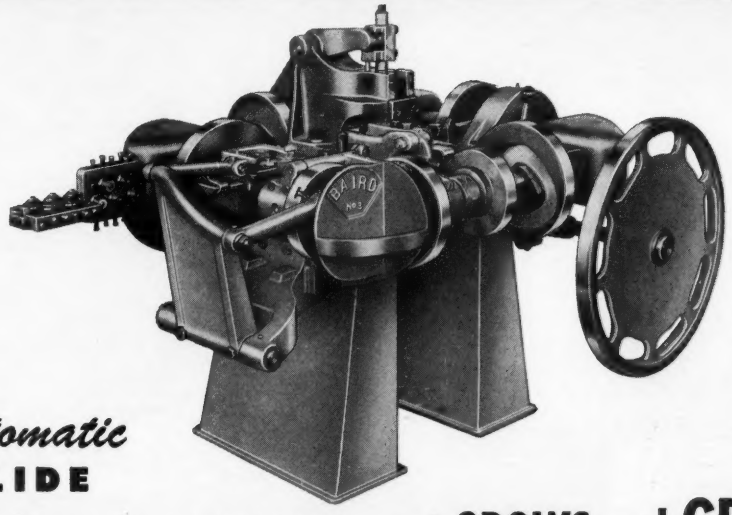
PROGRESSIVE CHEMISTRY FOR OVER A CENTURY

ASK BAIRD ABOUT IT!

HIGH PRODUCTION TOOLING



BAIRD *Automatic* FOUR SLIDE

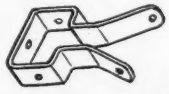
. . . the Machine that GROWS and GROWS and GROWS

Start, if you wish, with the standard (stocked) 4-slide, which in itself is remarkably versatile in forming hundreds of articles from wire and ribbon metal.

Then when conditions demand . . . a call for either even greater versatility of production or a change in certain products . . . you may add one or more attachments to the standard model, so designed that "machine growth" is simplified and practical.

Thus, with gradual investments, you will build your Baird 4-slide to a full production unit capable of turning out the widest variety of wire and ribbon products. Here is a list of attachments easily added . . . but naturally, not all on one machine . . . as they might become too complicated.

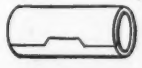
1 Horizontal Press Attachments



2 Form Raising Attachment

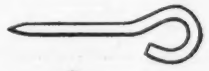
3 Pin Pulling Attachment

4 Setting Attachment

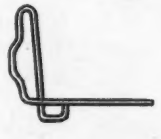


5 Secondary Cut-Off Attachment

6 Nail Point (Vertical Cut-Off) Attachment



7 Vertical Forming Attachment



Baird engineers will gladly develop tooling from your parts or specification. "Ask Baird about it!"

the BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

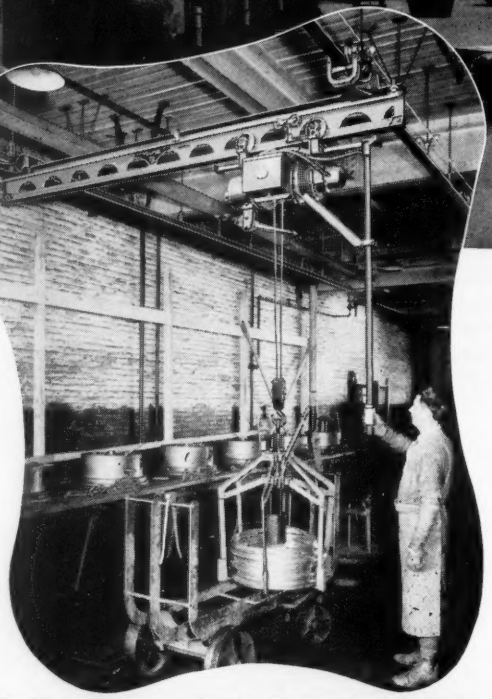
48A52

Modern slotted blocks are easily stripped with Cleveland Tramrail internal block-stripping equipment.

The FAST, EASY WAY OF STRIPPING BLOCKS

With an overhead Cleveland Tramrail block-stripping crane or carrier, it's a fast, easy job to remove wire from wire-drawing blocks. This equipment has been especially designed for the work by Cleveland Tramrail. The carriers are equipped with rigid arms for easy pushing of carrier and bridge. A push-button station is conveniently located in the lower end of the arm for instant operation of the electric hoist. If desired, the hoists may be mounted on a turn-table to serve blocks on two sides of an aisle.

For many years, Cleveland Tramrail has been the leading supplier of block-stripping cranes and carriers to the wire industry, for both internal and external stripping. Hundreds of such units are in operation.



For blocks that are not slotted a Cleveland Tramrail block-stripping crane with external stripper makes it a simple task to remove the wire.

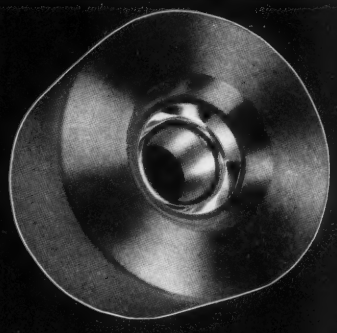
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
9215 EAST 288th STREET, WICKLIFFE, OHIO

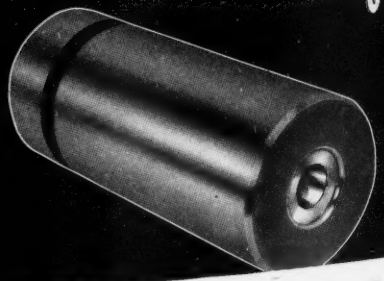
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

SHAPED CARBIDE DRAWING DIES



ROUND CARBIDE DRAWING DIES

Now—finish carbide dies up to 20% faster!



CARBIDE HEADING DIES

ELGIN DIAMOND in DYMO-C*

*"C" *for carbides.*

. . . At last a diamond compound that really works on carbide dies

CUTS CARBIDE FINISHING TIME UP TO 20%!

•

FIELD TESTED AND PROVED ECONOMICAL!

•

DEVELOPED FOR USE WITH ANY STANDARD SIZING OR POLISHING METHOD!

•

READY TO USE—NO MIXING!

ELGIN "DYMO-C" is completely new . . . virgin diamond powder pre-mixed as a compound . . . specially prepared to *finish carbide dies faster!* Actual tests show time savings up to 20%! Send for complete information today . . . ask for a free demonstration on your own dies, in your own plant.

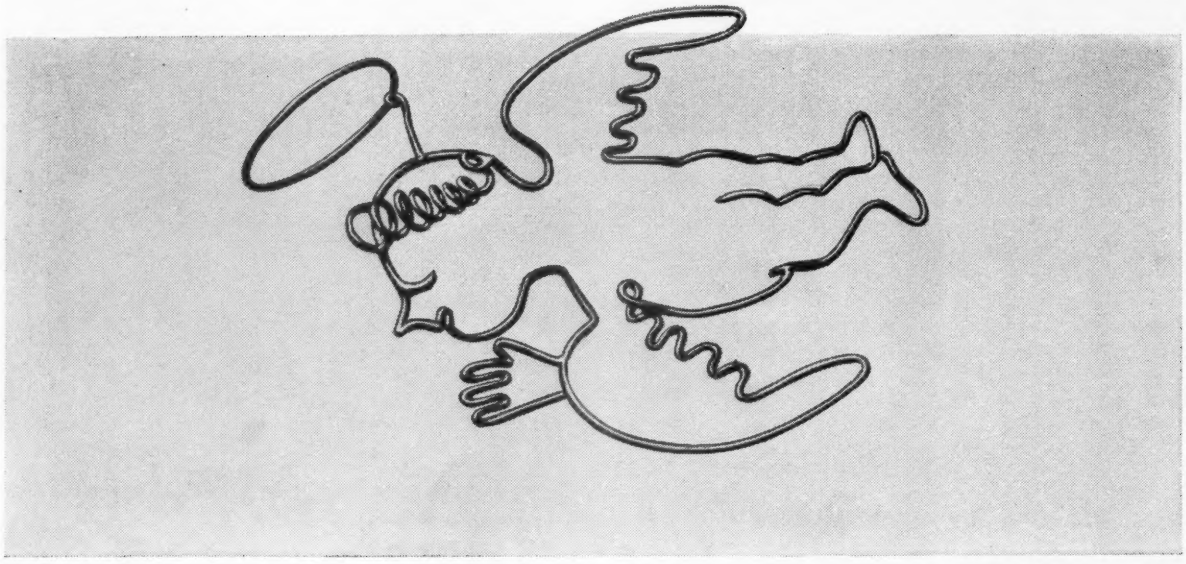
ALL ELGIN DIAMOND COMPOUNDS ARE COMPLETELY PRODUCED BY ELGIN, AND *CERTIFIED* TO CONFORM TO U.S. BUREAU OF STANDARDS SPECIFICATIONS

Abrasives Division

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

THE WIRE
WITH THE **Perfect Temper**



Many a production man thinks Chase engineers are "angels" for producing wire that unwinds from the coil smoothly and without twist. It's uniform in gauge, temper and color; has superior heading or flowing characteristics.

There's a Chase wire for most applications. Write for *FREE* booklet—"Chase Cold Heading Extruded Brass and Copper Alloy Wire" giving physical and fabrication properties, applications, weights per 1000 feet and feet per lb.

CMP orders. We can make favorable mill deliveries on authorized Controlled Materials orders. In many cases our warehouses can ship from stock. Your inquiries are invited.

● **CHASE TECHNICAL SERVICE**
Our metallurgical engineers are familiar with military specifications for brass and copper for ordnance components, and will be glad to consult with you on the selection of these metals for defense orders.

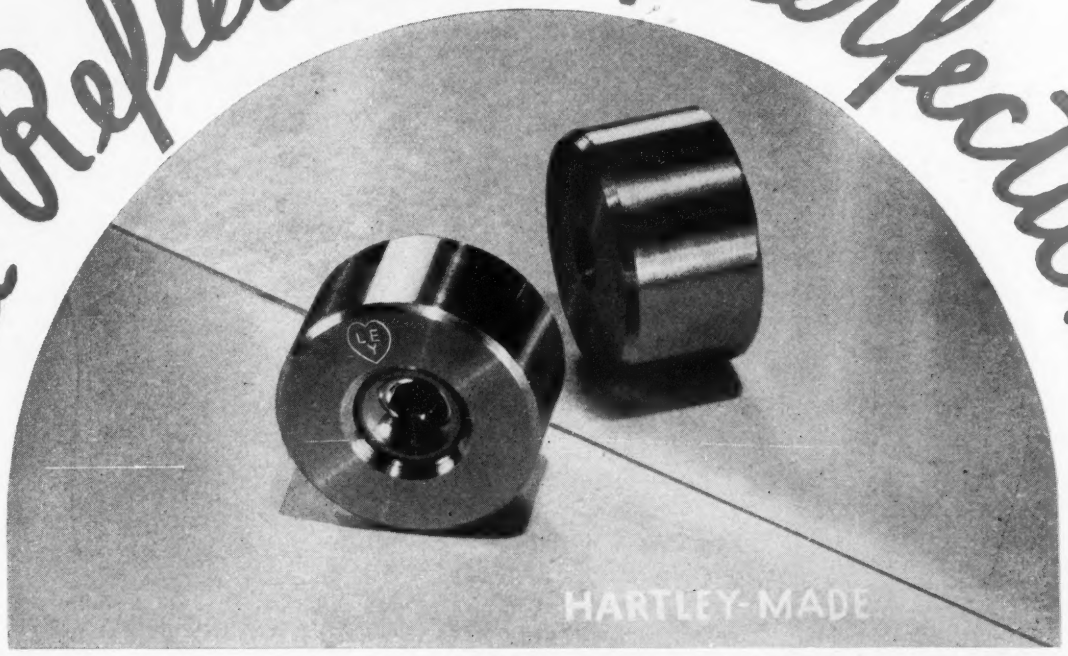
Chase® **BRASS & COPPER**

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

• *The Nation's Headquarters for Brass & Copper*

Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	
Chicago	Houston†	Newark	Rochester†	(†sales office only)
Cincinnati	Indianapolis	New Orleans	St. Louis	

a Reflection of Perfection



A full line of carbide dies, tools and parts are made by HARTLEY. Write, wire or phone today for our special bulletin. A representative will call upon you if you want technical service.

TUNGSTEN CARBIDE DIES

You owe it to yourself to investigate HARTLEY DIES. In first cost and in drawing wire you can offset some of today's high costs through definite savings.

Why? Because every effort on the part of craftsmen and management is made to produce dies that are so perfect that maximum life and service are assured.

Only the finest materials and most skilled workmanship can produce the perfect dies that HARTLEY consistently manufactures. That is why we GUARANTEE these qualities.

To keep your costs at bed-rock levels, order HARTLEY DIES—you'll like them and, like others, come back for more.

102 YEARS OF CONTINUOUS SERVICE

WATCH FOR THE HEART ON *Every* DIE

your assurance of highest quality and service

L E Y

TRADE MARK

HARTLEY
TOOL & DIE COMPANY
THOMASTON, CONNECTICUT
Telephone 625-626

PITTSBURGH, PA. · MAY 8-9, 1952

A place and dates to look forward to for the

PITTSBURGH REGIONAL MEETING

of the

WIRE ASSOCIATION

Mark them on your calendar and make your plans now to be there! It's going to be an informative and very worth-while two-day affair, with activities centered in the WILLIAM PENN HOTEL, Pittsburgh.

The program committee, headed by Tom M. Girdler, Jr., Union Drawn Steel Division of Republic Steel Corp. and assisted by C. Raymond Harmon of Firth-Sterling Steel and Carbide Corp., has arranged the following schedule of affairs for members of the WIRE ASSOCIATION:

Thursday, May 8th, 8 A.M.: Registration desk open 8 A.M. to 6 P.M., 17th floor.

10 A.M.: Meeting of the Board of Directors in Parlor G, 17th floor.

12 Noon: Board of Directors Luncheon in Allegheny Room, same floor.

1:30 P.M.: Busses leave the Hotel for a tour of the plant of the Firth-Sterling Steel and Carbide Corp. Ladies are invited to go on this trip. *Admittance to the plant granted only to those wearing badges and arriving on the chartered busses.* Please do not try to go to McKeesport in private car — you cannot be admitted.

6-7 P.M.: Cocktail party in the Pittsburgher Room through the joint courtesy of R. H. Miller and Standard Industrial Compounds Companies.

7:00 P.M.: Banquet in the Pittsburgher Room. The speaker will be Thomas Patton, Vice President and Chief Counsel of the Republic Steel Corporation. Ladies are invited to the banquet.

Friday, May 9th, 9 A.M.: Technical session in the Monangahela Room, 17th floor.

PAPER: Drawing of Aluminum Wire, by Joseph Urbinik, Plant Supt., Kaiser Aluminum Co., Newark, Ohio. Covers both standard and fine sizes.

PAPER: The History and Development of Planetary and Thread Rolling Machinery, by George Paff, D. H. Prutton Machinery Co., Cleveland, Ohio.

SYMPOSIUM: Mechanical Cleaning of Rods and Wire. William Baldridge of Laclede Steel Company will serve as moderator, with discussion panel members as follows: Floyd Hauger, Standard Industrial Compounds Co., E. T. Miller, Firth Sterling Steel and Carbide Corp., and W. H. Hill, Northwestern Steel and Wire Co. W. E. Hill, Jr. of Russell, Burdsall and Ward is chairman of this session.

11:15 A.M.: Busses will leave the Hotel to visit the Monessen wire mill of the Pittsburgh Steel Co. Charles Williams of the company is in charge of the tour.

TICKETS: A registration fee of $6.00 will be charged, that will cover tickets for the two plant visits. Tickets for the banquet will cost $6.00 and may be secured at the registration desk. Get your tickets immediately upon arrival.

Members may bring guests. We shall hope to see you there.

THE WIRE ASSOCIATION

Richard E. Brown, Executive Secretary

453 MAIN STREET **STAMFORD, CONN.**

New Building Wire with Glass Braid

SMALL IN DIAMETER . . . MAXIMUM FISHABILITY

SATURATED AND FINISHED with NEWLY DEVELOPED *Solar* COMPOUNDS

Wire manufactured by Triangle Conduit & Cable Co., Inc., New Brunswick, New Jersey.*

This new building wire with its recently perfected covering provides superior protection and maximum flexibility. It's small in diameter, light-weight . . . easy to carry and store. The wire is tough enough to withstand tight coiling without chipping, flaking or peeling off. And it's extra smooth—neither sticky nor gritty—for maximum fishability.

The newly developed Solar compounds with which the wire is saturated and finished contribute significantly toward its versatile characteristics. The saturant and finisher, specially compounded for use over glass braid, permanently bond the individual fibers and set new standards for resistance to heat, fire, rot and moisture. In addition, the wire is painted with a Solar Soldura color solution for polarity identification and as an antistick.

Perhaps this saturant and finisher, or another of the Solar compounds or Soldura color solutions, can help you make a better product. Our laboratory facilities and technical staff are available to you without obligation. Write Solar Compound Corporation for further information.

*Trademark, "Glazon"

TECHNICAL INFORMATION

SOLARITE KS-566 SATURATING COMPOUND

Composition: Composed of processed asphalts combined with other ingredients particularly chosen for their low susceptibility to temperature changes.

Specifications:

Softening Point—ASTM D-36-26 . 140° F. Minimum
Penetration @ 77° F., 100 grams, 5 seconds—ASTM D-5-49 60-75
Stormer Viscosity @ 300° F., 100 Revolutions . . . . . 85-110 Seconds
Specific Gravity @ 25° C.— ASTM D-71-27 . . . . . 1.00-1.04
Flash Point—ASTM D-92 . . . . . 500° F. Minimum
Fire Point—ASTM D-92 . . . . . 600° F. Minimum

CHARACTERISTICS AFTER APPLICATION:

Aging Characteristics: Will remain flexible indefinitely when applied under recommended, controlled conditions.

Flame Resistance: Has some flame resistance, but must be used with a flame-retardant finisher to meet Underwriters' Laboratories Standards.

Moisture Resistance: Excellent.

Low Temperature Resistance: Retains flexibility at temperatures as low as 0°F.

High Temperature Resistance: Will not cause sticking in coils up to 140° F. when used with recommended finishing compounds and anti-stick coatings.

Coverage: Estimated coverage 50% of the weight of the glass.

SOLARITE KF-561 FINISHING COMPOUND

Composition: Composed of a blend of oxidized petroleum asphalts particularly chosen for their low susceptibility. Efficient flame retarding ingredients are chemically combined.

Specifications:

Softening Point—ASTM D-36-26 . 220° F. Minimum
Penetration @ 77° F., 100 grams, 5 seconds—ASTM D-5-25 14-16
Viscosity, Stormer—360° F. . . . . 3-10 RPM
Specific Gravity @ 77/77° F.— ASTM D-71-27 . . . . . 1.02-1.06
Flash Point—ASTM D-92 . . . . . Over 500° F.

CHARACTERISTICS AFTER APPLICATION:

Aging Characteristics: Flexibility will be retained when applied as recommended.

Flame Resistance: Designed to meet Underwriters' Laboratories Standards.

Moisture Resistance: Meets Underwriters' requirements when applied over saturated braids.

Low Temperature Resistance: When used with saturants recommended specifically for cold bend resistance, the finished wire may be bent around the same sized mandrels used in the moisture tests without flaking at 0° C. Solarite KS-566 is a recommended saturant. Other saturants may be employed depending upon the conditions to be met.

High Temperature Resistance: Mica or paint to be used as an antistick.

General Characteristics: Will not discolor properly formulated color solutions.

THE NEW SOLAR CATALOG CONTAINS:

Pictorial presentation of complete laboratory and plant facilities
Detailed description of all major testing methods
Product end uses, description and composition
Methods of application
Characteristics after application
And other valuable technical information

Catalog available to executives and technical men. Please send request for your free copy on company letterhead.

Solar Compounds Corporation
Solar Varnish Corporation
1213 WEST BLANCKE STREET • LINDEN, N. J.

For years, Design Engineers have specified with confidence, products which have been finished with Industrial Finishes by STANDARD. That's because they recognize and appreciate the advantages of a product whose finish gives longer, more durable protection through years of hard wear and abuse and still continues to look attractive.

There can be no doubt that products and equipment treated with Finishes by STANDARD consistently give finer performance and service in spite of punishing conditions.

Finishes to meet U. S. Government specifications.

Superior on-the-job performance and quality have linked Industrial Finishes by STANDARD to Industry since 1870.

STANDARD VARNISH WORKS
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COATINGS • COMPOUNDS • CHEMICAL PRODUCTS

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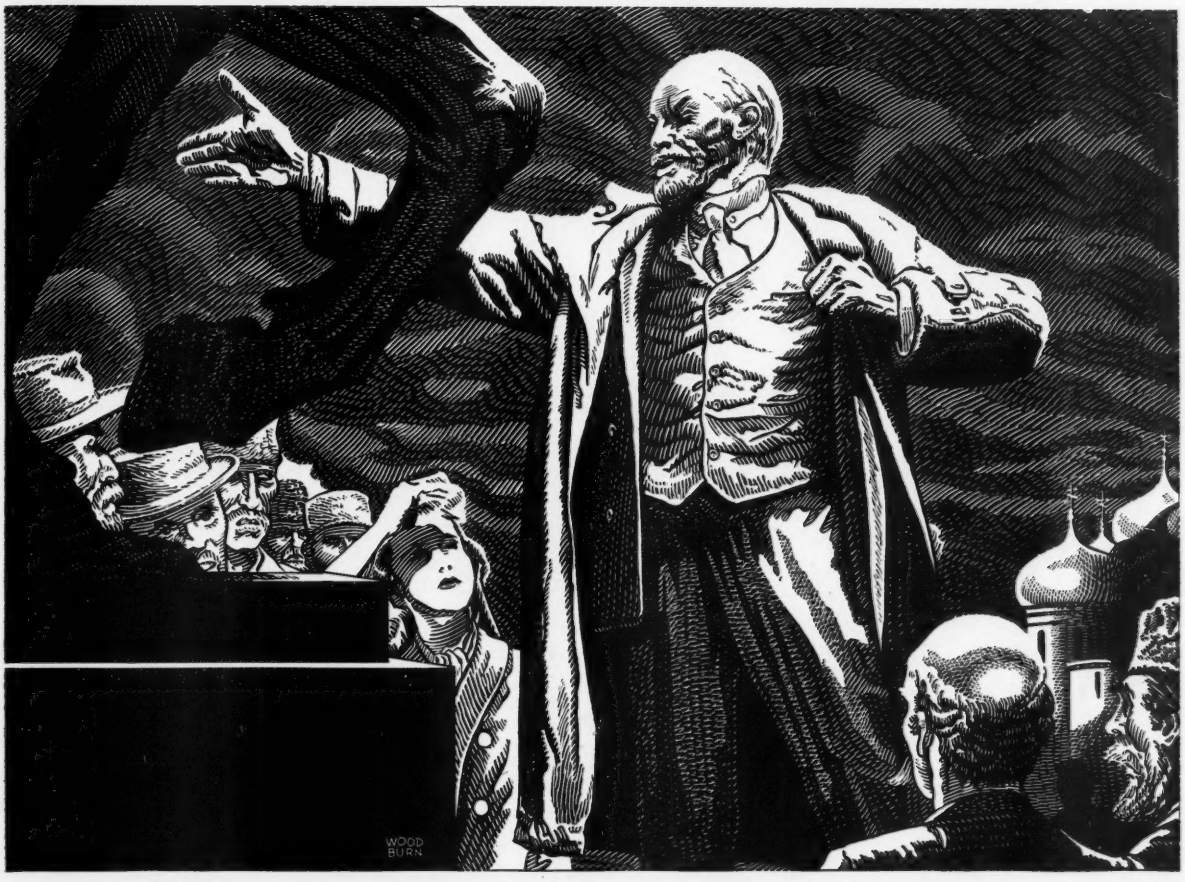
CHICAGO
2000 Federal Street
Chicago 16, Ill.



Let us prove this prophet false

"We shall force the United States to spend itself into destruction."

These are the words of Lenin, father of Russian Communism. Quoted from page 191, volume xxi, of his Collected Works, they were printed recently in a metropolitan newspaper.

This is the announced goal of the Politburo, and it is the direction in which many patriotic citizens fear we are headed. For example, Congress has just appropriated $87 billion to be spent during 1952, and enacted taxes estimated to produce only $71 billion. The deficit is to be added to our national debt, already $259 billion; and this deficit will depreciate the national currency by another $16 billion.

Part of this stupendous appropriation is to rearm ourselves and the free world against Communist attack. But what about the rest of our spending?... Let us also be realistic. It is time for us as a nation to pause, reflect and consider well. We can do three things to avoid national bankruptcy:

1. Eliminate every non-essential federal expense.
2. Provide taxes to pay all obligations as we go.
3. Pay off some of our national debt every year.

Let every citizen who believes in preserving our nation from the economic termites within, as well as from the announced enemy without, become an active worker to prove the Russian prophet false.

YOUR SCRAP YOUNGSTOWN IS NEEDED

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

KENNECOTT

ROME CABLE ROME, N.Y.

PHELPS DODGE COPPER PRODUCTS CORPORATION MINE TO MARKET

WIRE SX PRODUCTS

Call on these well-known manufacturers

ANACONDA from mine to consumer REG. U.S. PAT. OFF.

GENERAL CABLE

NATIONAL COILS

*For electrical wire insulated with Vitron GLASS YARN

Glass yarn is our business. We furnish the manufacturers whose trademarks appear here with what we proudly believe to be the finest glass yarns—made by the exclusive Glass Fibers electronic-extrusion process.

Use of VITRON insulated wire sold by these manufacturers is bringing many advantages throughout the electrical field.

LOW SPACE FACTOR—Compact VITRON Glass Yarns provide effective insulation reinforcement in minimum space.

ADDED DURABILITY—VITRON resists heat, solvents and decay that destroy organic electrical insulating materials.

IMPROVED ELECTRICAL PROPERTIES—Noncellular, inorganic VITRON will never absorb moisture, permanently helps maintain finest insulating effectiveness.

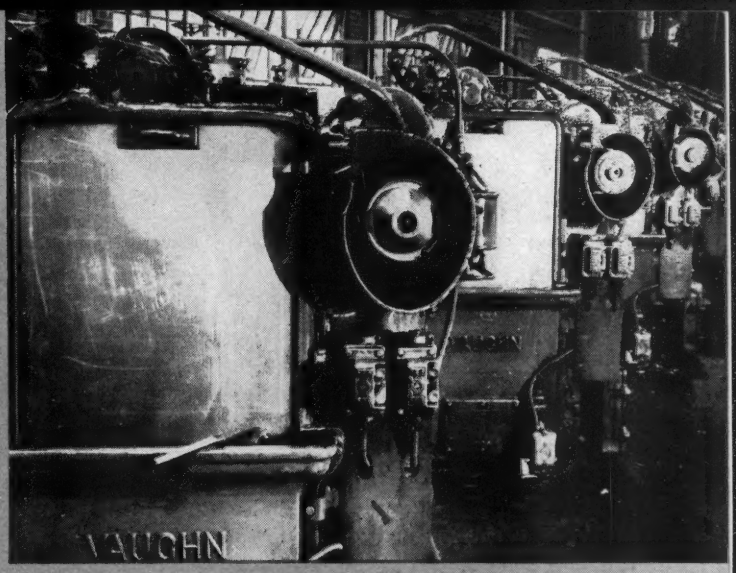
These manufacturers are prepared to supply you with a wide range of VITRON-insulated electrical wire and cables. Call them directly for your requirements, or if we can help you locate a source of VITRON-insulated materials, call us in for consultation.

Vitron® GLASS FIBER

ELECTRICAL INSULATING MATERIALS

GLASS FIBERS INC. • 1810 Madison Avenue
TOLEDO 2, OHIO

HIGH SPEED
+
HIGH FLEXIBILITY
mean
HIGH PRODUCTION
on every assignment



RINGBLOX®

MOTOBLOC®

with

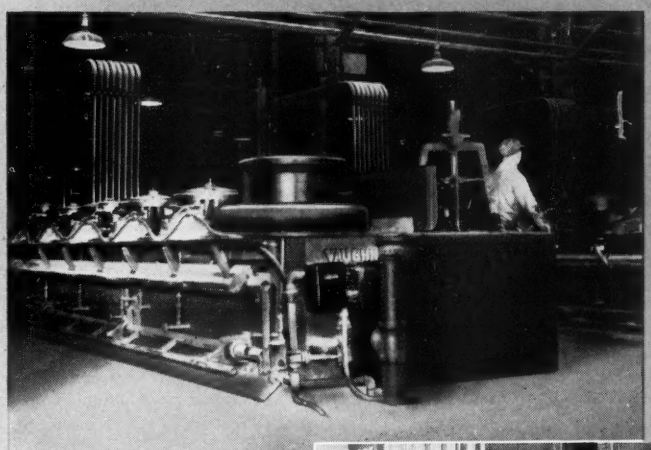
Vaughn®

COLD DRAWING EQUIPMENT

From finest wire to heavy bars, tubes and shapes, Vaughn Cold Drawing Equipment provides fast, smooth production with maximum versatility in operation. The reasons are matters of fact—easily demonstrable, clearly superior! May we point out Vaughn's profit-potential for you?

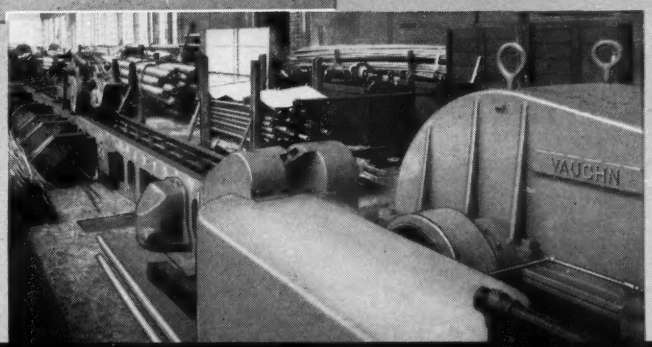
THE VAUGHN MACHINERY CO.
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

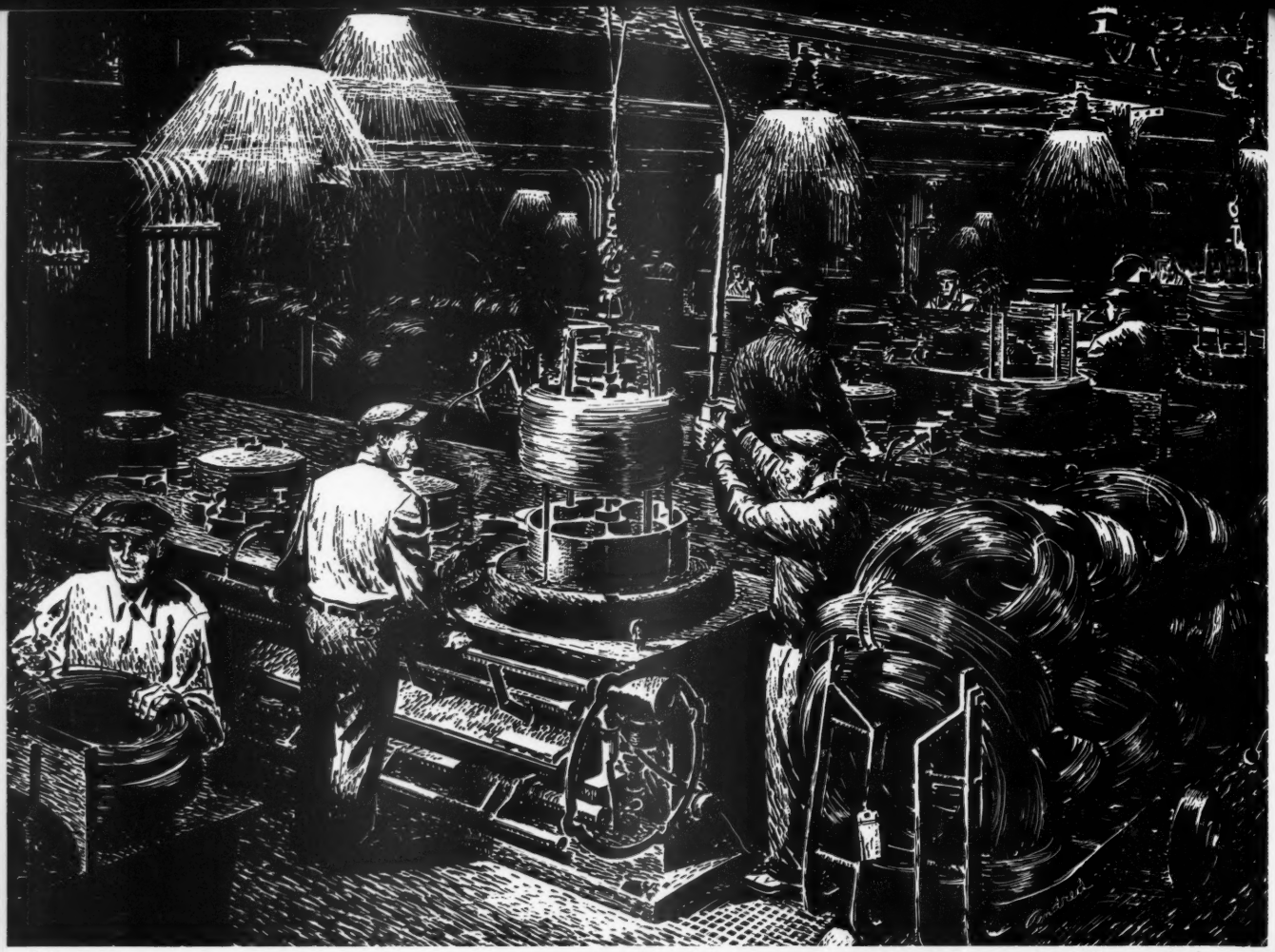


MOTOBLOX®

V®



DRAW BENCHES



Wire Drawing *Scratchboard Drawing for Pittsburgh Steel Company by William Pendred*

Progress in Steel

Steel wire, one of the vital threads that holds civilization together, will soon be produced in even greater quantity at Pittsburgh Steel as a result of the company's planned Program of Progress which will increase its steel-making capacity fifty percent by July, 1952.

Pittsburgh Steel Company today is one of the largest producers of wire in the United States. Shown above is a small segment of the wire drawing department at the Monessen Works. Here, high-quality steel rods are drawn through a series of tungsten-carbide dies to reduce their diameter to the desired wire gauge. With more steel available, it will be possible to increase the wire production of this department plus Pittsburgh Steel's subsidiary, the Johnson Steel & Wire Company with plants at Worcester, Mass.; Akron, Ohio; and Los Angeles, Calif.

The precision wire produced in all these operations serves you and industry in many ways—as special oil-tempered spring wire for tanks, planes, military vehicles, automobiles, agricultural implements, locomotives and household appliances. Pittsburgh barbed wire protects our troops and fences our farms. Wire is also woven and welded into fence to protect military installations, factories, homes and farms. Special cold-heading wire is used for forming into rivets, bolts, screws and thousands of small mechanical parts and fasteners. Other Pittsburgh wire goes into textile looms and such every-day items as automobile tires, paper clips, musical instruments, coat hangers and even bobby pins.

The demand for more wire of all kinds grows daily. Likewise, the nation needs more tubular products, more hot and cold rolled sheet and strip. Pittsburgh Steel's Program of Progress is designed to help meet this demand. The program entails expanding the blast furnace and open-hearth furnaces to provide more steel capacity. This required the installation of a new high-lift blooming-slabbing mill which was completed last year. It includes the construction of facilities for producing hot and cold rolled strip and sheet at the Allenport Works.

At war and at peace, civilization depends upon the millions of tons of steel produced in the United States each year. The industry recognizes the vital necessity of providing more steel, better steel, if civilization is to survive. That is why the Program of Progress at Pittsburgh Steel Company, an important part of the steel industry's vast expansion program, is being rushed to completion.

Pittsburgh Steel Company

Pittsburgh, Pennsylvania

"Increased Production ...Improved Quality"

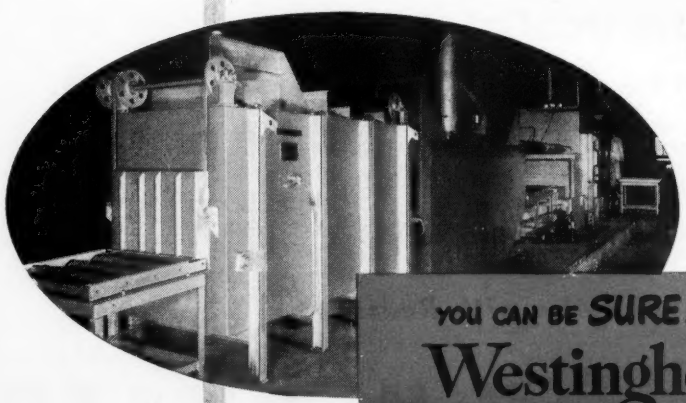
...says large tool company

"Stepped up production and improved the quality of our products," says a large tool company of this Westinghouse electrically heated, gas carburizing furnace. Steel parts . . . of a wide variety of shapes and sizes . . . are carburized, quenched, washed, drawn and discharged. Operation is straight line and completely automatic.

The result: Precise, *uniform* carburization of all parts, faster operation, and elimination of bottlenecks caused when trays must be manually removed.

A Westinghouse gas-fired Endogas generator provides the proper, safe controlled atmosphere. In addition, all auxiliary equipment is also Westinghouse, including motors, controls and material handling equipment . . . *a complete "packaged" installation from a single source.*

Gas-fired or electric, there's a Westinghouse furnace to meet every heat-treating need. Westinghouse Electric Corporation, Industrial Heating Works, Meadville, Pennsylvania. J-10369



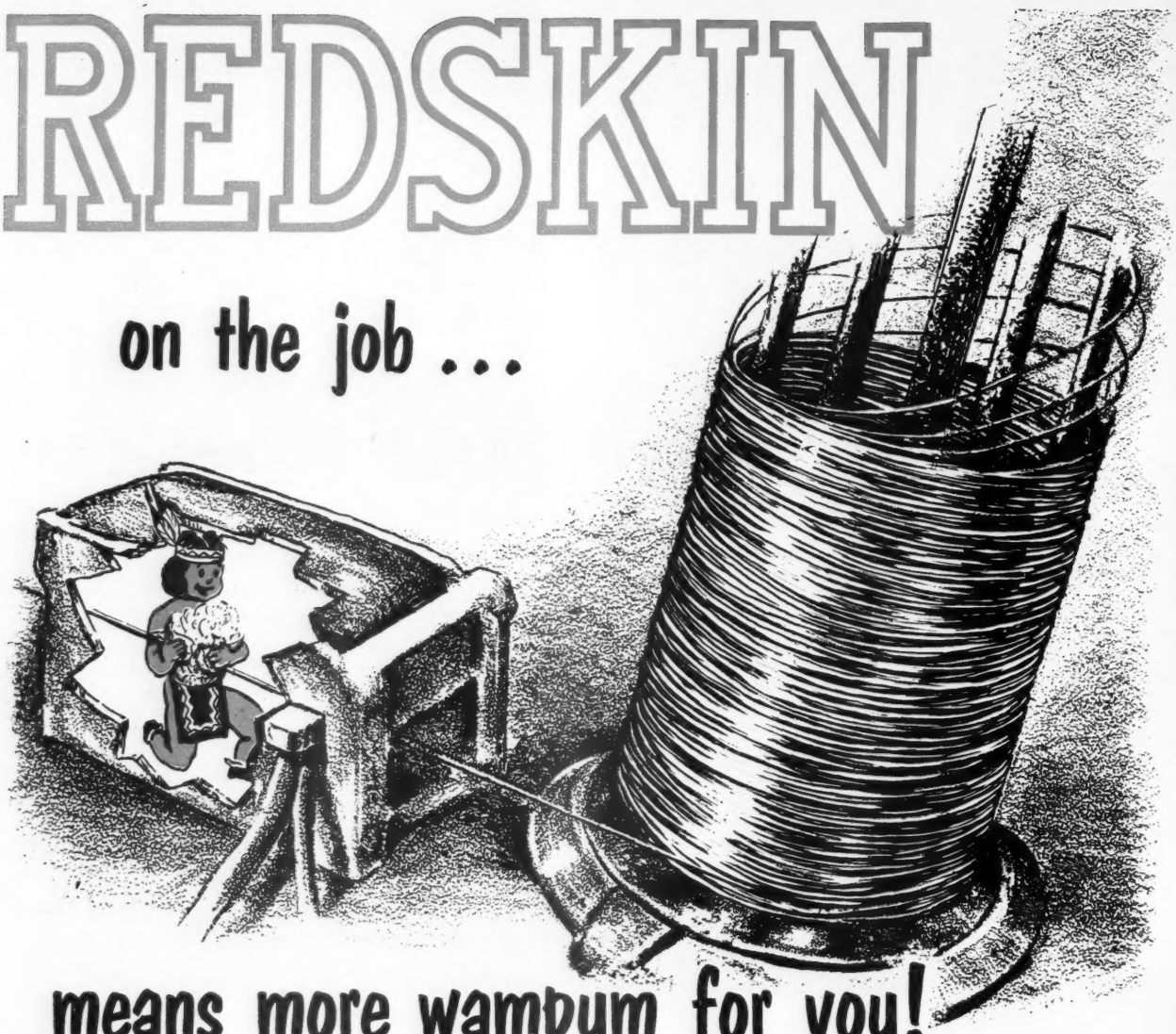
IF YOUR PRODUCT CALLS FOR HEAT-TREATING . . . IT CALLS FOR A WESTINGHOUSE FURNACE . . . GAS OR ELECTRIC

YOU CAN BE SURE... IF IT'S Westinghouse

HEAT-TREATING FURNACES

REDSKIN

on the job . . .



means more wampum for you!

- ***Lower cost insures substantial savings.***
- ***Gives improved die-life at increased speeds.***

What's more, Redskin uniformity and quality are guaranteed — and Redskin copper coating *requires no electricity, no special equipment* since it's a single chemical which dissolves instantaneously.

Investigate the advantages of using Redskin in your plant. Write TODAY for complete information.

Copper Coat your wire with Redskin

Steelskin LUBRICANTS

R. H. MILLER
Company, Inc., Homer 1, N. Y.

Here's what we're doing

about the steel wire situation:

FIRST, of course, we're pushing production to the very limit.

Second, we're working with you, the user, to help you get the most out of the wire you're getting. Here's what we mean:

If you're having steel wire trouble, turn your problem over to our metallurgists. They've tangled with just about every problem in the history of wire fabrication. A problem that is totally new to you, may be a simple matter of recorded history for us.

For example: You may be using a wire that's unsuitable for the job it has to do. Perhaps a different grade can be used that will give the desired performance. Maybe your fabricating techniques can be improved, resulting in more uniform physical properties and less scrap.

You may be able to improve your product and actually cut your costs at the same time. We've seen that happen plenty of times.

In any event, if you have a wire problem, we'll be glad to give you all the help we can. We've always offered this service, but we think it's particularly valuable now.

UNITED STATES STEEL COMPANY
AMERICAN STEEL & WIRE DIVISION, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN MANUFACTURERS WIRE

AMERFINE—*High-quality fine wire.*

AMERSPRING—*music steel spring wire.*

AMERLOY—*alloy heading wire.*

AMERTEMP—*heavy-duty oil-tempered wire.*

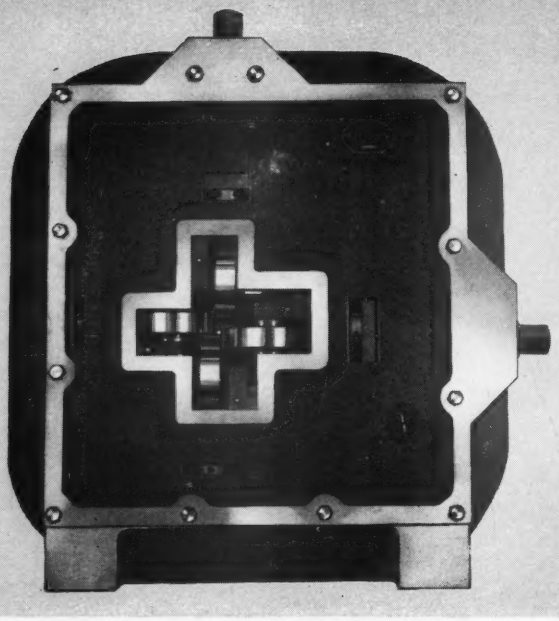
AMERHEAD—*uniform heading wire.*

AMERSTITCH—*extra-tough metal stitching wire*

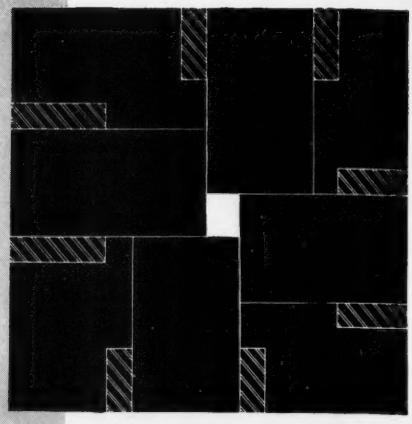
U·S·S AMERICAN MANUFACTURERS WIRE

USS TRADE MARK

UNITED STATES STEEL



THE FENN TURKS HEAD offers many advantages over ordinary methods of shaping wire and rod. Featuring adjustable roll boxes, it *rolls* the material on both horizontal and vertical planes simultaneously. Available in friction drive or power drive.



UNIQUE FEATURE of Turks Head design is shown in this diagram of roll assembly. Four converging rolls form material to the desired shape. Square and rectangular shapes may be produced in varying dimensions by a simple roll adjustment.

Only Fenn Turks Heads bring you

MORE ACCURATE WIRE SHAPING AT LESS COST

A radical departure from the conventional draw-die, the Fenn Turks Head is characterized by the unusual operation and exceptional versatility of the die, in which the sides of the opening are four adjustable rolls. When the rod or wire is being formed into the more common square or rectangular shapes, the rolls may be adjusted to produce any width or thickness, in dimensions ranging from 0 to capacity.

EXCLUSIVE ADVANTAGES

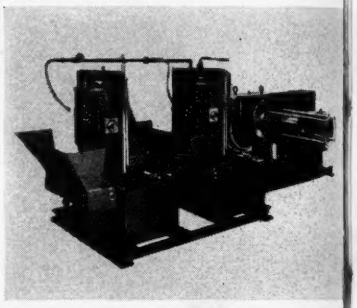
Increased Accuracy. When wire is shaped by ordinary rolling methods, the final rolling operation is apt to affect the dimensional accuracy secured by the edging process. By doing both these jobs at once — at the same point on the wire — Turks Heads eliminate this hazard. Also, since they roll *with* the work, Turks Head roll-surfaces are subjected to far less wear than rigid dies. This keeps wire sizes constant for a much longer period, to tolerances of ±.0005.

Greater Economy. Turks Heads eliminate the need for a costly inventory of stock as well as multiple dies, save the labor of frequent changing and redressing, and require less power than other methods.

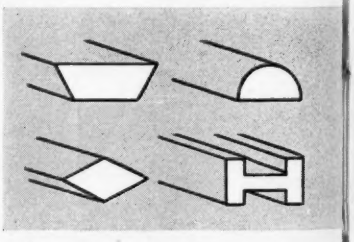
Faster. Besides their two-in-one operation, Turks Heads permit faster wire speeds.

GET THE DETAILS

on the many benefits Fenn Turks Heads can bring to your own wire-shaping operations. Contact your nearest Fenn Distributor, or write direct to THE FENN MANUFACTURING COMPANY, 1853 Broad St., Hartford 1, Conn.



FENN ROLLING MACHINES are built to take all sizes of Turks Heads, in double stand (as shown) or single stand.



ALL FROM THE SAME UNIT. Producing a wide variety of shapes from a single Turks Head is simply a matter of changing the specially ground rolls.

FENN MACHINES ARE SOLD BY:

ATLANTA
J. R. Walraven
BALTIMORE
Refer: Calco Mach'y Co., Phila.
BIRMINGHAM
Quinn & Quinn
BOSTON
Refer: Reynolds, Inc., Providence
BUFFALO
Syracuse Supply Co.
CHICAGO
Neff Kohlbusch & Bissell, Inc.
CINCINNATI
The Seifreat-Elstad Machinery Co.
CLEVELAND
Wm. K. Stamets Co.
COLUMBUS
The Seifreat-Elstad Machinery Co.
DALLAS
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The Wire Outlook

In 1951 steel production totaled a little over 105 million tons. Present capacity should make possible 112.5 million in 1952, provided strikes and scrap shortages do not upset the potentials. Wage increases doubtless again will be granted but companies will not be allowed to increase prices correspondingly. This will lead to lower profits.

The dearth of scrap therefore looms as the most imminent cause of a continuing shortage of steel, although one major producer believes that the shortage is primarily chargeable to bad distribution and CMP red tape. The scrap question, however, is not confined to steel. There is an acute need for scrap of every basic metal and it becomes the concern, not only of metal producers, but of every manufacturer who hopes to buy metals for fabrication purposes.

General business activity is being maintained at a peak level with changes, if there be such, likely to be slow and moderate. A strong demand for all metals is seen as continuing well into 1952, with military needs taking approximately 40% of the carbon steel supply. Alloy and stainless steel percentages will run even higher. Dollarwise, defense spending took 11% of all production in 1951, as against 7% in 1950.

Analysis of the Christmas trade buying indicated that while it was high, there was much shopping for price and quality. Money was not thrown around, even though savings had mounted sharply in 1951. The significance of this lies in the fact that there was no panic buying, as there is so often in war-scare years, reducing the likelihood of the development of a runaway inflation.

The new Congress looks as though it may clamp down on business-as-usual Federal squandering. The Administration seems prone to follow the Hopkins formula of "tax and tax, spend and spend, elect and elect", which Senator Byrd says has brought the country face to face with a "financial peril as great as that of war itself". It is more essential than ever that non-military boon-doggling be stopped now. In unnecessary Federal spending lies our real threat of inflation.

Serious shortages are in prospect for copper and aluminum electric wire and cable. The tremendous requirements for telephone and power transmission cable for military depots and camps, for new manufacturing facilities and for utility expansions are creating demands well in excess of supply. While the copper, lead and zinc outlook has improved somewhat in anticipation of larger imports, the supply is not likely to meet all needs. Our tin stocks are at an all-time low. Normal consumption runs 5200 to 5500 tons monthly, further aggravated by the mounting requirements of the defense program.

Some softening in the demand for wire products has been noted in different parts of the country, due to some degree to the reduction in production schedules on consumer durables. This has affected both high and low carbon steel wire and resulted in a somewhat easier supply of rods. Galvanized wire is one of the most difficult items to get.

On the equipment manufacturing side, while the leading wire drawing machinery concerns are still offering twelve month deliveries, those who are making equipment for the electric wire fabricators are catching up with their backlogs and many are able to deliver within three to four months of the receipt of an order.

If we would maintain our liberty, let us not look to our government. It lies in the hands of the people and it is now the job of every citizen to wash the slate clean and begin anew with more definite limits on our government's powers.

—from the Editor's Desk

PAY-OFF REEL STAND

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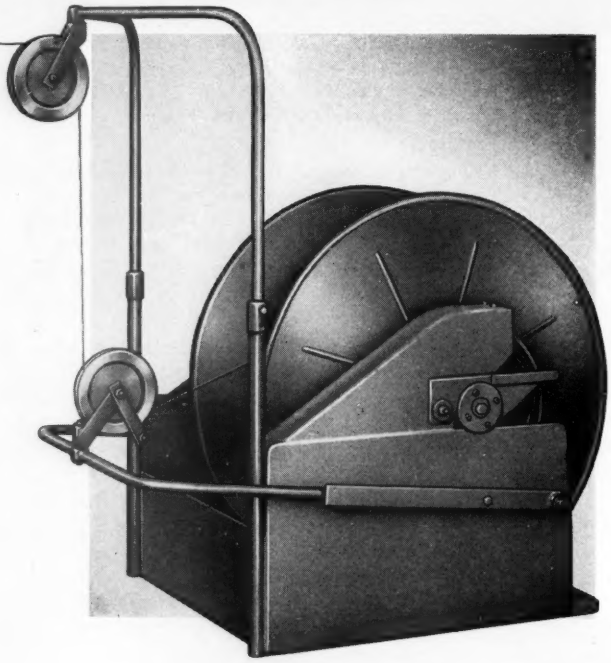
★ **FOR HOLDING REELS WHILE PAYING OFF WIRE, WITH TENSION CONTROL, FOR CONTINUOUS VULCANIZER, PLASTIC EXTRUDING AND SIMILAR MACHINES**



OUTSTANDING FEATURES

- Wire may be drawn off reel in any horizontal direction relative to the reel axis.
- Height of Pay-Off Sheave adjustable for wire heights from 35 to 45 inches.
- Reel Shaft supported at both ends.
- Pay-Off Stand is a self-contained unit requiring no installation.
- Will accommodate wire sizes from #21 to #12 A. W. G.

DESCRIPTION

The Pay-Off Reel Stand, Type T is a removable shaft construction with a band type drag and brake unit for controlling the wire tension.

The wire, as it leaves the reel, passes around a swivel sheave supported by a tubular-constructed arm controlling the drag. The wire then passes over the pay-off sheave, also swivel mounted, permitting the wire to be paid-out horizontally in any direction from the Pay-Off Reel Stand.

Reel shaft is furnished with driving dog, dog pins and holding collar to fit customer's reels.

The Pay-Off Reel Stand is available in three frame sizes to accomodate 24 inch, 30 inch, and 36 inch diameter reels. A ramp can be furnished for intermediate reel sizes.

See Page 181 for a complete listing of JLE Products for the Insulated and Bare Wire Industry.

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Vol. 27 FEBRUARY, 1952 No. 2

Beryllium Copper Wire: Its Processing and Uses

by John T. Richards, Development Engineer
The Beryllium Corporation
Reading, Pennsylvania

By virtue of its outstanding engineering properties, beryllium copper wire is finding increased use in a wide range of industrial applications. These include many types of springs and miscellaneous wire forms, requiring high elastic and endurance strength and corrosion resistance. Other useful properties are good electrical and thermal conductivity, nonmagnetic characteristics and excellent wear resistance. To meet varying service requirements, beryllium copper wire is available in several heat-treatable tempers as well as pretempered wire. Heat treatable material is formed or coiled in the "as received" condition, then precipitation hardened to the desired combination of final properties. Pretempered stock, on the other hand, can be subjected to all but the most severe forming operations and requires no further treatment by the fabricator.

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Although beryllium copper wire has been commercially available for twenty years, little has been written regarding its processing characteristics or engineering properties. In perhaps the first paper devoted to beryllium copper wire, Bassett (1) considered the effects of beryllium content and cold drawing on strength and electrical conductivity. Corrosion resistance and the influence of tin and cadmium additions were also studied. Subsequently, Masing and Haase (2) found wire a convenient form for following modulus changes during age hardening. Several authors (3, 4) have treated the subject in a general way, while others (5, 6) have called attention to certain processing characteristics. As part of a continuing investigation on the engineering properties of beryllium copper wire, preliminary results have recently been briefly summarized (7), followed by a more comprehensive report (8).

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Part I

This article is the first of two that have been prepared by the author, this one covering the processing of beryllium copper wire, including forming, heat-treating, plating, joining and applications; the second, to appear shortly, will be devoted to the engineering properties of this wire.

Specification Data

At the present time, commercial beryllium copper wire, nominally 1.9 per cent beryllium, is supplied to the following compositional limits:

Beryllium	**1.80-2.05%**
Additive elements:	
Nickel or cobalt, or both, min	**0.20%**
Nickel plus cobalt plus iron, max.	**0.60%**
Copper plus beryllium plus additives	**99.50%**

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Wire is generally supplied in either of two heat treatable tempers or the pretempered condition as indicated in Table I. Cold drawn (half hard) or pre-tempered stock has sufficient formability to withstand normal spring coiling and can be wrapped around its own diameter. Solution annealed wire is specified where upsetting or severe forming is required.

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TABLE I. — CONDITION-AND TEMPER OF BERYLLIUM COPPER WIRE

Mill Treatment	As Supplied	After Precipitation Hardening
Cold drawn and solution annealed	A	AT
Cold drawn, solution annealed and drawn half hard	½ H	½ HT
Pretempered (homogenized and cold drawn)	PT	.....

TABLE II. - TOLERANCES ON DIAMETER OR DISTANCES BETWEEN PARALLEL FACES

Diameter or Distance Between Parallel Faces, In.	Tolerances, plus or minus, in. Rounds	Hexagons, Octagons
0.010 and under	0.0002	-
Over 0.010 to 0.020, incl.	0.0003	-
Over 0.020 to 0.030, incl.	0.0005	-
Over 0.030 to 0.040, incl.	0.0007	0.002
Over 0.040 to 0.050, incl.	0.0008	0.003
Over 0.050 to 0.060, incl.	0.0010	0.003
Over 0.060 to 0.080, incl.	0.0015	0.004
Over 0.080 to 0.375, incl.	0.0020	0.004

Although round wire is regularly furnished in diameters ranging from 0.002 in. up to ⅜ in. by B&S gage numbers and common fractions, other shapes including hexagons, octagons and flat wire are also available in certain size ranges. Commercial tolerances for beryllium copper wire are listed in Table II, while Table III presents mechanical property limits for heat treatable, precipitation hardened and pretempered material.

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Currently, beryllium copper wire is covered by ASTM, AMS and Government (Military) specifications. These are given in Table IV. It should be noted that Navy, Army Air Forces, and Army-Navy Aeronautical specifications for beryllium copper products are now obsolete and have been superseded by the Military series.

TABLE III. - MECHANICAL TEST LIMITS FOR BERYLLIUM COPPER WIRE

	Condition	Diameter, in.	Tensile Strength, psi	Elongation in 2 in., min., per cent
Heat Treatable (as supplied)	A	-	58- 78,000	35
	1/2 H	-	110-135,000	2
After Precipitation Hardening	AT	-	165,000 min.	-
	1/2 HT	-	190,000 min.	-
Pretempered	PT	0.100-0.1140	115-130,000	-
		0.075-0.0999	120-140,000	-
		0.040-0.0749	140-165,000	-
		Under 0.040	180-205,000	-

TABLE IV. - SPECIFICATIONS COVERING BERYLLIUM COPPER WIRE

Authority	Specification
American Society for Testing Materials	B197
Society of Automotive Engineers (Aircraft Material Specifications)	AMS 4725
Military	MIL-C-947 (Ships) MIL-C-6941

Note: Revision letters and date suffixes, which frequently change, are not listed.

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Fundamental Metallurgy

Before discussing the processing characteristics of beryllium copper wire, several structural and theoretical aspects of the material should be considered. Although beryllium copper was originally furnished as a binary alloy, commercial materials now contain small quantities of cobalt or nickel to inhibit grain growth and provide more uniform hardening response. Minor impurities generally include iron, silicon, aluminum, tin and zinc.

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Copper will dissolve about 2.1 per cent beryllium at temperatures in the solution treating or annealing range (see Fig. 1) with decreased solubility at lower temperatures. Rapid cooling (quenching) from a temperature within the field of maximum solubility will preserve this condition, so that there exists at room temperature a supersaturated solid solution (metastable alpha phase) with relatively high ductility and relatively low hardness strength and conductivity. Since only about 0.25 per cent beryllium is soluble in copper in the range 550-750 F., aging at a temperature in this range will cause precipitation of the gamma phase from the unstable solution accompanied by an increase in hardness, strength and conductivity.

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Beryllium in excess of the 2.1 per cent alpha phase solubility limit forms beta phase, an extremely hard solution consisting of approximately 6 per cent beryllium, balance copper. The presence of beta, as a result of excessive beryllium content or faulty mill practice, not only makes wire drawing difficult but also gives a brittle final product. The form of the beta phase, when present, is all important, since small and well distributed particles offer less of a problem than large concentrations or stringers.

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To reduce the tendency toward beta formation, current practice generally calls for the casting of ingots or wire bars to a beryllium content

at the lower end of the 1.80-2.05 per cent range mentioned above. Since the phase diagram shown in Fig. 1 refers to the binary copper-beryllium system, the addition of small quantities of cobalt or nickel for stabilizing purposes can be expected to reduce slightly the solubility of beryllium. It should be pointed out that excessive beryllium present in the form of beta phase, oxide or cobalt beryllide serves no useful purpose. In fact, any or all of these forms can act as stress raisers, thereby causing production problems and decreasing the life of the finished component.

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The useful properties of heat treated beryllium copper wire result from a two-step thermal treatment designed to take full advantage of the precipitation hardening aspects of this alloy. The first or solution annealing operation softens the material, while the second or heat hardening treatment hardens the wire. In most cases, the fabricator is only concerned with second or hardening operation, since solution annealing is generally performed by the mill prior to shipping. Recommended heat treating procedures are subsequently discussed.

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Although annealing or solution treating is generally considered as the conventional means of softening beryllium copper for further working, approximately the same result can be accomplished by the thermal treatment known commercially as "homogenizing". Heating for approximately 8 hours at 100 F causes substantial precipitation of the gamma phase and its eventual spheroidization with recrystallization of the alpha matrix with a minimum grain growth (6). The resulting spheroidal structure has excellent working characteristics and can withstand heavy cold reductions. Material so treated is known as pretempered wire.

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Since it derives its strength solely from cold work, pretempered wire must be heavily drawn to provide favorable mechanical properties. Consequently it is generally not possible to attain maximum strength in the heavier gages. Fortunately, pretempered wire does not strain harden as rapidly as annealed and cold drawn wire, so that it provides adequate formability even at high strength levels. Although pretempered wire does not require heat hardening following fabrication, a stress relieving operation may be needed for certain critical application. It should also be pointed out that the final properties of pretempered wire are slightly lower than those obtained from fully heat treated material.

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Cold Working

In first considering heat treatable wire, hot rolled rod stock is cold drawn to finished gage with one or more intermediate annealing treatments. Reductions between successive annealing operations are dependent upon available facilities and the effectiveness of the preceding anneal, but generally range from 60 to 85 per cent. To provide needed formability, the final reduction usually runs 37 to 50 per cent (half or three-quarter hard). Of course where annealed stock is required for severe forming, annealing follows the final cold reduction.

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For pretempered wire, drawing practice is not unlike that applied to annealed stock, although heavier reductions are possible following homogenizing. The cold drawing range can be materially increased by intermediate stress relieving operations. In addition to its role in producing pretempered wire, homogenizing can also serve as a process or intermediate annealing operation. Where the stock has to be restored to a condition suitable for subsequent heat or age hardening, the usual solution treatment is applied at the last annealing point. Although homogenizing is generally a bulk heating operating, solution annealing or stress relieving can be handled by either strand or bulk methods.

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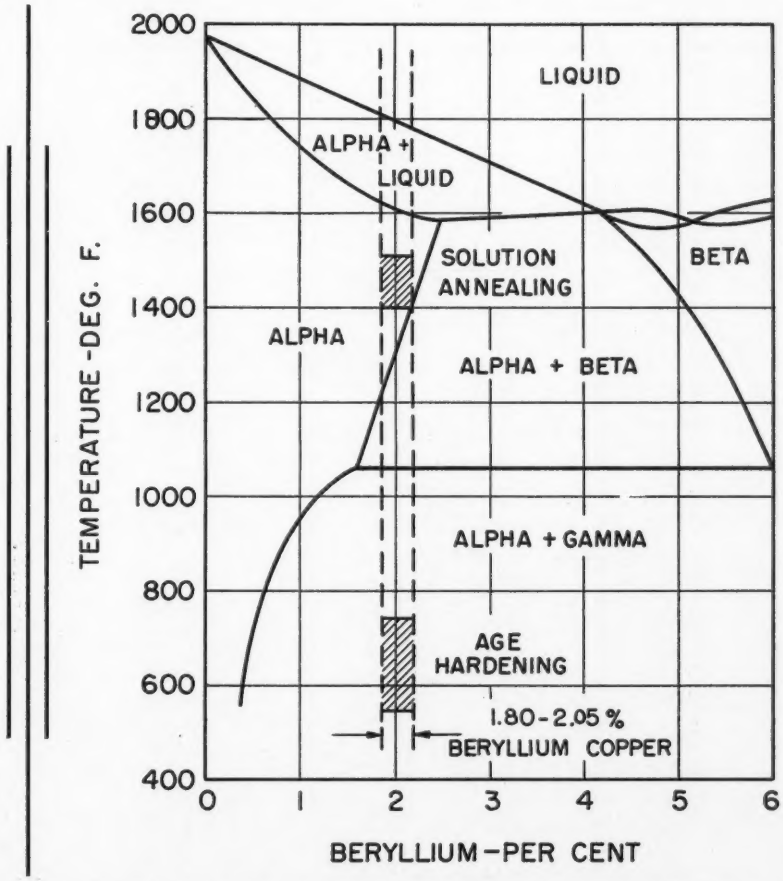

Fig. 1—Copper-rich end of the beryllium copper phase diagram with solution annealing and age hardening range indicated.

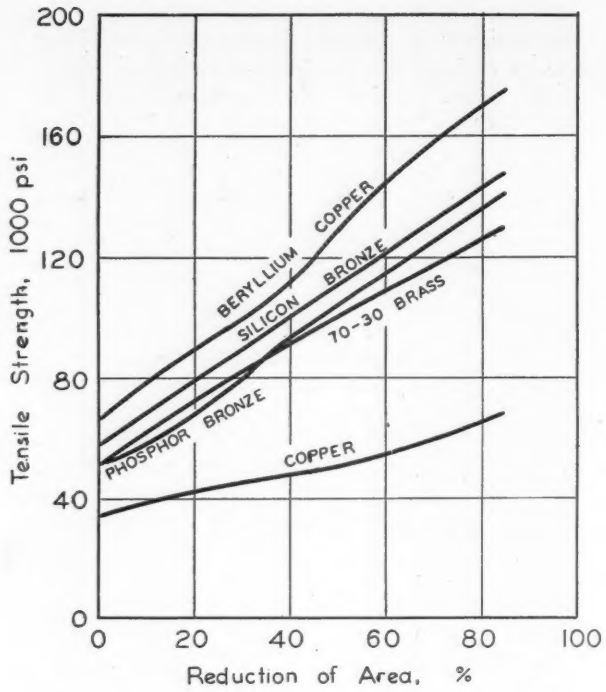

Fig. 2—The work hardening rates resulting from cold drawing for several copper-base alloys.

Properly cleaned wire can be drawn wet or dry without difficulty. For dry drawing, soap powder is frequently employed, while an extreme pressure lubricant such as sulfurchlorinated oil should be used for wet drawing. For best results, lubricant selection should consider ease of removal. In some instances, wire may be cadmium plated to prevent surface oxidation and to act as a lubricant. These coatings are satisfactorily retained during drawing but are removed prior to annealing.

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The accompanying Fig. 2 provides a comparison of the work hardening rates of several wire materials, while Fig. 3 compares annealed and homogenized beryllium copper on the same basis.

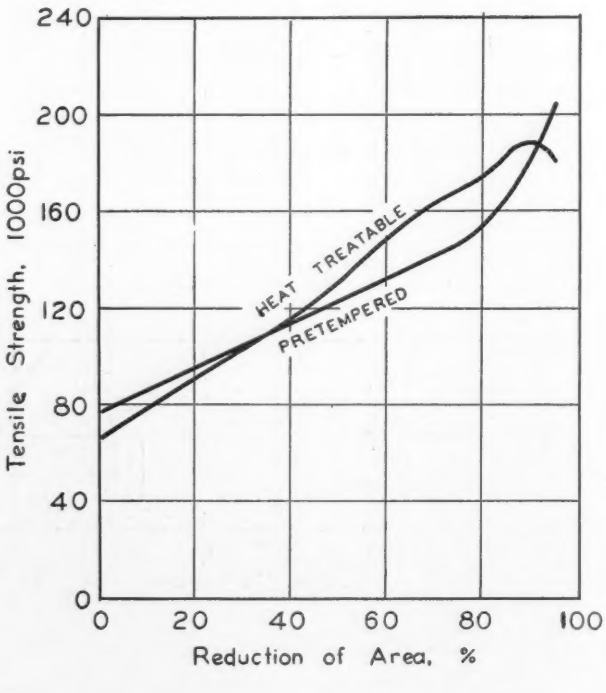

Fig. 3 — A comparison of the work hardening rates of heat treatable and pretempered beryllium copper wire.

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Although pretempered wire can be readily coiled into compression or extension springs with automatic coiling equipment, heat treatable material presents a problem. During subsequent heat hardening, coiling stresses are relieved so that springs are likely to distort. By coiling and heat treating compression springs on a mandrel, this problem can be overcome. Even with mandrel-coiled springs, however, it is not possible to retain initial tension in extension springs due to the stress relieving feature of heat hardening. Consequently pretempered wire is usually recommended for extension and torsion springs and similar forms.

★ ★ ★

Heat Treating Practice

Solution-Annealing: The solution treatment serves the dual purpose of softening the material for further cold working and forcing the beryllium into solution so that it is available for subsequent hardening. Rapid quenching in water from the annealing range is necessary to retain this structure at room temperature.

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For most applications, relatively small grain sizes present the most favorable combination of engineering properties. Although low annealing temperatures can be depended upon to restrict grain size, care should be exercised to insure a high degree of beryllium solubility. Short times at high temperatures in the annealing range generally give good solubility, but with larger grain sizes.

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The recommended annealing range for beryllium copper wire is 1450 to 1475 F. Since heat treating facilities vary considerably from one plant to the next, it is not possible to suggest annealing times and temperatures to meet all requirements. For best results, however, the temperature should not fall below 1400 F, otherwise excessive beta phase may result. On the other hand, if the annealing temperature exceeds 1500 F, large grain sizes will be developed with the possibility of a duplexed structure. If the temperature

runs as high as 1565 F, incipient fusion is likely to occur at the grain boundary followed by melting of the matrix at slightly higher temperatures.

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Any type of furnace covering the range of 1400 to 1500 F. is suitable; however, salt baths should not be used since most salts attack beryllium copper rather rapidly in this range. Although strand annealing equipment offers certain advantages, particularly in the smaller wire sizes, good results can also be obtained through bulk heating. Wire should be free from dirt, oil and grease when placed in the furnace, while cadmium plate should be stripped prior to annealing.

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The oxide film formed during heating can be removed by pickling or can be prevented by bright annealing in moisture free atmospheres of cracked ammonia, hydrogen or city gas having a dew point of at least —40 F. Where it is not possible to attain this dew point requirement, it is necessary to carefully pickle all material, otherwise considerable difficulty will be encountered during drawing. Recommended cleaning procedures are subsequently discussed. For best results, fine wire should be bright annealed whenever possible.

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Precipitation Hardening:—The age-hardening feature of beryllium copper offers design advantages not available in alloys that are not responsive to heat treatment. In addition, many strain hardening materials may require stress-relieving; however, beryllium copper can be stress relieved in its hardening range, so that no special operation is needed. An important advantage of beryllium copper over certain other age-hardening alloys is its simple heat treatment which can be carried out at relatively low temperatures in an uncontrolled atmosphere without subsequent controlled cooling.

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It is of significance that by varying hardening times and temperatures, different combinations of properties can be obtained, including strength, ductility, conductivity and resistance to anelasticity. In order that full advantage can be made of available properties, the type of hardening treatment selected should be based upon the requirements of the particular application.

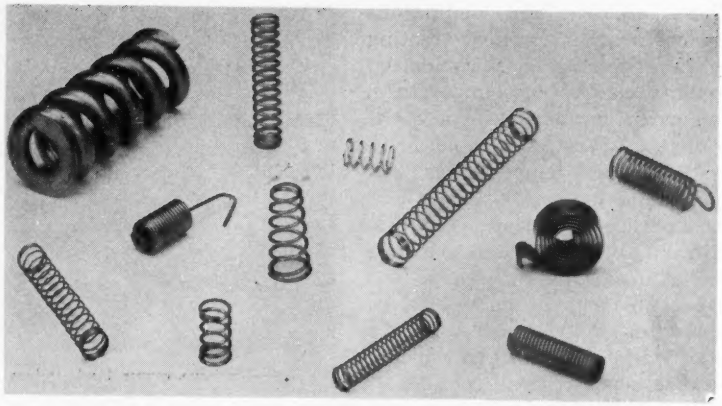

Fig. 4—Typical compression, extension and power springs fabricated from beryllium copper round and flat wire.

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As previously indicated, strength, hardness, conductivity and modulus increase during heat treating. For a given temperature in the hardening range, these changes proceed with time; some reaching a peak and decreasing with additional time, while others continue to increase. Raising the hardening temperature reduces the time required to reach maximum strength or hardness.

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The standard hardening treatment for beryllium copper wire calls for heating at 600 F. for three hours in the case of annealed material or two hours for cold drawn stock. This standard low temperature treatment is easy to control, is not critical with respect to time and produces the highest degree of strength and hardness. For special applications it may be advantageous to consider the short-time, high-temperature treatment which requires from 90 to 15 minutes at temperatures ranged from 650 to 725 F. Advantages of this method include (1) better resistance to drift and fatigue, (2) higher conductivity, (3) greater degree of stress-relief for fixture hardening and dimensional control, and (4) considerable saving in heat treating time.

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The best hardening time and temperature for a given combination of properties is dependent upon such variables as temper, amount of forming in making the part and heat treating facilities. Consequently some experimentation may be necessary to obtain special properties. This is especially true when employing the short-time, high-temperature heat treatment, which is critical with respect to time. For best results, test samples should be hardened in the same furnace, or the same type of furnace, as used for production. If added ductility is needed to permit some forming following heat hardening, an overaging treatment will provide increased ductility with some loss of strength.

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Although circulating air furnaces, muffle furnaces or salt baths are satisfactory for the standard, low-temperature treatment, short-time, high-temperature hardening requires closer time and temperature control than usually obtainable in a muffle furnace, so that a forced-circulation furnace or a salt bath is preferred. Because the heating rate is slower in a muffle furnace, hardening will require a longer time than in an air furnace. A salt bath by giving faster heat transfer requires 25 to 50% less total time than a circulating air furnace.

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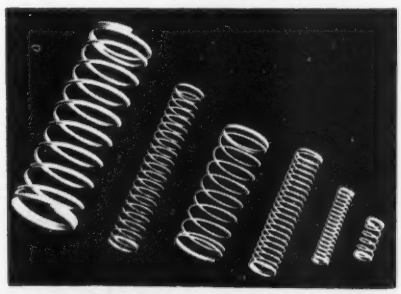

Fig. 5—These relay springs must be fabricated to extremely close tolerances to minimize adjustment. (Courtesy Instrument Specialties Co.)

There are available numerous types of furnaces for heat treating beryllium copper which provide the necessary control of temperature. When hardening at 600 F., a variation of ± 10 F. is permissible; however, at higher temperatures this range should be limited to ± 5 F. If temperature variations exists within the furnace, variations can be expected in hardness response. The thermocouple should be located so that readings will be representative of the charge. Controlled or bright atmospheres are generally not necessary, since the discoloration caused by heating in air does not affect engineering properties.

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Salt baths through rapid and uniform heating give good results at any temperature in the hardening range of beryllium copper and offer special advantages for short-time, high-temperature work and fixture hardening. Commercially available nitrate-nitrite mixtures (40 to 50% sodium nitrite, balance sodium or potassium nitrate), which melt at 290 F. are usually employed. For best results, a bath used for beryllium copper should be kept clean and not used for other materials such as steel. After removal from the bath, parts should be carefully cleansed of all traces of salt. Adherence to the following cleaning procedure is suggested: (1) quench in cold water, (2) wash in hot cleaning solution, (3) rinse in hot water, and (4) dry. The chocolate-colored film that remains is in no way detrimental to the properties of the material and, where necessary for appearance, can be readily removed.

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Parts should be both clean and free from dirt, oil, grease or moisture when placed in the furnace or bath. Following hardening, parts can be cooled at any convenient rate; however, quenching in cold water permits handling and definitely fixes the end of hardening time. For applications requiring a bright finish for subsequent processing or appearance, the oxide film formed during hardening can be removed by pickling or prevented by controlled atmosphere aging.

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The use of the fixture heat treating method in the manufacture of beryllium copper coil springs can result in substantial economies. Wire can be wound cold on mandrels and subsequently hardened with the mandrel serving as a holding fixture. The hardening cycle relieves residual stresses, so that springs retain the dimensions to which they were originally coiled. Elimination of springback makes hand adjustment during assembly unnecessary, while good uniformity over long runs entails inspection of only a small percentage of parts (9).

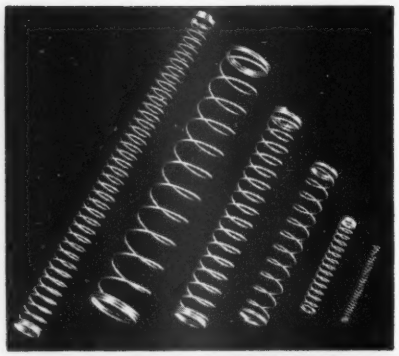

Fig. 6—Beryllium copper brush springs offer a unique combination of strength and conductivity, thereby frequently making it possible to eliminate the pigtain or shunt. (Courtesy Instrument Specialties Co.)

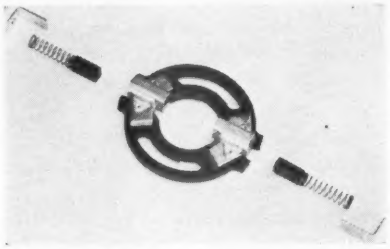

Fig. 7—Typical brush holder assembly showing beryllium copper brush springs.

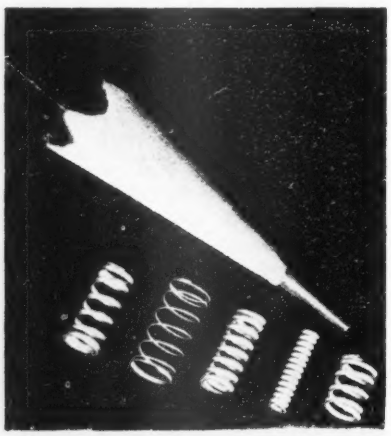

Fig. 8—Beryllium copper means high strength and less space in these compression springs for small compact switches. (Courtesy Instrument Specialties Co.)

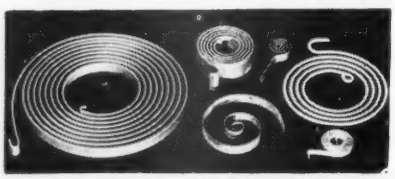

Fig. 9—These spiral springs fabricated from round and flat beryllium copper wire offer stability, high strength, good conductivity and corrosion resistance for instrument, regulator, scale and motor brush applications. (Courtesy Instrument Specialties Co.)

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Homogenizing: The homogenizing treatment applied in the production of pretempered wire generally runs four hours at 1000 F. In the case of process homogenizing the treatment is eight hours at 1040 F. As previously indicated, the homogenized structure permits heavy cold reductions and prevents abnormal grain growth. By virtue of the lower temperature involved in this operation, edge folding and sagging of the bundles are prevented while waves and buckles induced by quenching can be eliminated. The usual bulk annealing equipment can be employed for homogenizing.

★ ★ ★

Stress Relieving: Since heat treated wire is stress relieved in the hardening range, no further treatment is necessary following the coiling of springs and miscellaneous wire forms. In the case of pretempered wire, however, it may sometimes be advantageous to stress relieve following the fabrication of certain critical components. The usual stress relieving treatment is 15 to 30 minutes at 300 F. If higher temperatures or longer times are employed, some softening of the material will result.

★ ★ ★

Cleaning and Plating

An oxide film forms on beryllium copper when heated in an uncontrolled atmosphere into either the hardening or annealing range. When necessary for appearance, soldering, brazing, plating or similar operatings, this scale can be easily removed by pickling. Proper cleaning is especially important following process annealing, otherwise excessive die

(*Please turn to page* 192)

DESIGNS AND BUILDS TOMORROW'S MACHINERY TODAY

EQUIPMENT CORPORATION

Wean

THE celebrated Cellini helmet has become a symbol of metal-working craftsmanship. For this reason we here at the Wean Equipment Corporation have chosen it as our trade mark.

For, like the talented Cellini, Wean works with metals—designing, engineering and building products that more than just meet accepted standards. Just as Cellini, Wean begins with a problem and finishes with a workable solution that satisfies even the most exacting critic.

Assembled behind the Wean name is perhaps the nation's leading staff of metal-working engineers—a group of creative men who make a practice of finding the proper solution to the toughest machine and equipment problems.

Wean is justly proud of these men and the records they have achieved—records that we feel have firmly established them as the metal-working craftsmen of our day.

WEAN EQUIPMENT CORPORATION
CLEVELAND . . . . OHIO

Production of Springs by Statistical Quality Control

by Edward E. Franks, Jr.
Engineer in Charge, Spring Machinery
The Torrington Manufacturing Company
Torrington, Connecticut

The new machine and method of spring tolerance control described herein, in practice has cut rejections almost to the vanishing point. The machine in question, manufactured by the author's company, while relatively new, was put through a long period of service before being made generally available to those who may have use for it.

A new testing machine designed to meet the demand for closer control in the production of coiled springs, has been developed, providing a ready method of testing both for the spring manufacturer and the ultimate user. The need for a machine of this type became apparent as springs of closer tolerances became more common and as statistical quality control was developed to a higher degree for the spring manufacturing industry.

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New and more difficult problems in spring manufacture are being solved by the use of these statistical techniques. One of the most interesting applications was in the control of centrifugal springs used in Ordnance Department fuzes. These springs are the heartbeat of artillery fuzes and must be tested 100% in arming tests prior to acceptance by Army inspectors. The control exercised in the testing of these springs prior to assembly has, at best, been sporadic and ineffective, which is due mainly to the lack of proper testing equipment and methods. As a result, many producers have resorted to costly 100% inspection, the elimination of which would mean a reduction in the cost of the springs and the costly replacement of springs in fuzes that failed to meet the arming tests.

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A typical control problem that could have been solved only by the use of this type of tester was posed by the requirements of the centrifugal spring in an artillery booster. The load specifications of the spring —(700 grains plus or minus 100 grains)—are quite liberal as far as percentages are concerned, but are almost impossible to measure with heretofore available equipment with any degree of precision. The new tester not only measures the load tolerance, but divides the load tolerance into far more than the **minimum** of ten steps, which is necessary in control charts for variables. The specifications are translated into hundredths of an ounce or 1.60 plus or minus .23 ounces and the tolerance can be measured in forty-six steps. Though this seems to be much finer than apparently practical, it serves a useful purpose, because the springs must be made to more stringent tolerances from the coiler than the final specifications. This first tolerance shifts as well as increases during the manufacturing cycle. This is shown graphically in figure 1 below. This is a process record of a lot of springs and shows the frequency distributions from the coiler, after heat treat and after plating. The picture shows the shifts of the load at the specification height as well as at a check load, and by drawing an envelope around the limits, the gradient can be determined. The free height is checked and plotted in frequency distribution form as an aid to the production process in determining proper setting and tool wear. From the figure, it can be seen that the final springs are far within the specifications, and this is due mainly to the control chart aid made possible by means of the tester.

★ ★ ★

The tester is essentially an even balance weighing scale mounted on a base, the underside of which is coated with sponge rubber to isolate vibration. The scale has a built-in dashpot to dampen the oscillation of the pointer and platters in testing. On either side of the weighing platters are mounted standards to support the spring length measuring devices.

★ ★ ★

All load testing is done at the even balance position, so that the datum point from the platter can be maintained for all measurements. This datum point is used to set the measuring heads at the appropriate height from the platters, so that the springs under test can be measured directly in thousandths of an inch by adding the set height to the measured reading on the micrometer or dial indicator. The deflection can be read directly on the measuring device under the test loads. The even balance scale has a sensitivity of one-hundredth of an ounce on the smaller tester and one-fifth of an ounce on the larger tester. The sensitivity is enough to satisfy the stringent requirements in statistical quality control work described above. The scales are built for rough usage in repetitive weighing operations in industry and need not be handled with the care of a laboratory instrument. The pointer travel in the three-pound scale is four inches per ounce on the platter, or four inches per inch of platter travel, and for the sixteen pound scale, the pointer travel is one inch per ounce and three inches per inch of platter travel. These sensitivities fulfill the most extreme gradients that would be encountered in coil spring manufacture or design. The pointer housing is between the two platters, so that it can be observed simultaneously with the spring on either platter. For load checks, the beam with a movable poise for balancing loads in testing, is used. The beam travel on the three-pound scale is one ounce graduated in hundredths, and on the sixteen-

pound scale is twenty ounces graduated in fifths of an ounce. All other weights are put directly on the left hand platter in testing loads that are greater than can be handled on the beam directly. In almost all cases, the tolerance limits on the loads can be handled on the beam alone.

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The tester can be set and calibrated without the use of special test apparatus. The length measuring device can be zeroed at any time with the use of set blocks or hooks which are used to set the micrometers or indicators. These auxiliaries are part of the tester and can be used to check the accuracy of the setting as well as the travel of the deflection measuring device. This is accomplished by the operator or inspector at the operating level as part of the testing routine. The load is even more easily checked by merely using the even balance scale and a set of standard weights. The load weights are checked against each other on opposite platters as well as against the beam and poise, and in this way, any discrepancy in the weighing apparatus is immediately picked up in a preliminary test. The self-checking feature is helpful in overcoming the psychological block that often accompanies the introduction of new methods of quality control. The operator and inspector cannot blame the testing apparatus for imperfections in the product that is being produced.

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As discussed above, the apparatus can be used throughout a wide range of loads and weights without a loss of sensitivity. The small tester can be used to check tension springs to five and one-half inches in length and compression springs to seven and one-half inches in length, with a deflection of one inch maximum. The larger tester can be used for tension springs up to nine inches long and compression springs to twelve inch lengths, with a deflection of three inches maximum. In both cases, the lengths and deflection can be checked to an accuracy of one thousandth of an inch. The loads can be measured to the nearest one-hundredth of an ounce up to the capacity of three pounds on the small tester, and to the nearest one-fifth of an ounce up to sixteen pounds on the larger model.

★ ★ ★

An extremely important aspect of spring testing has been provided for in the design of this tester—namely, the functional relationship to the load test. In short, this is the method of testing as it relates to the use of the spring in its useful function. In some cases, the spring operates in a drilled cavity or on a pin and the spring can be tested in exactly the same manner as it is used, rather than on a standard anvil. Both the platters and the measuring heads are equipped to take interchangeable fittings that simulate the conditions under which the spring will operate. In the last illustration, the fittings are shown that are used to test a spring through a deflection of two and one-half inches. Buckling of the spring and its friction on the supporting pin influence the load of a relatively weak spring, and cannot be taken into account in any other way, but by testing the spring in the true relationship to its end use. Many other fittings are used to determine the suitability of a given

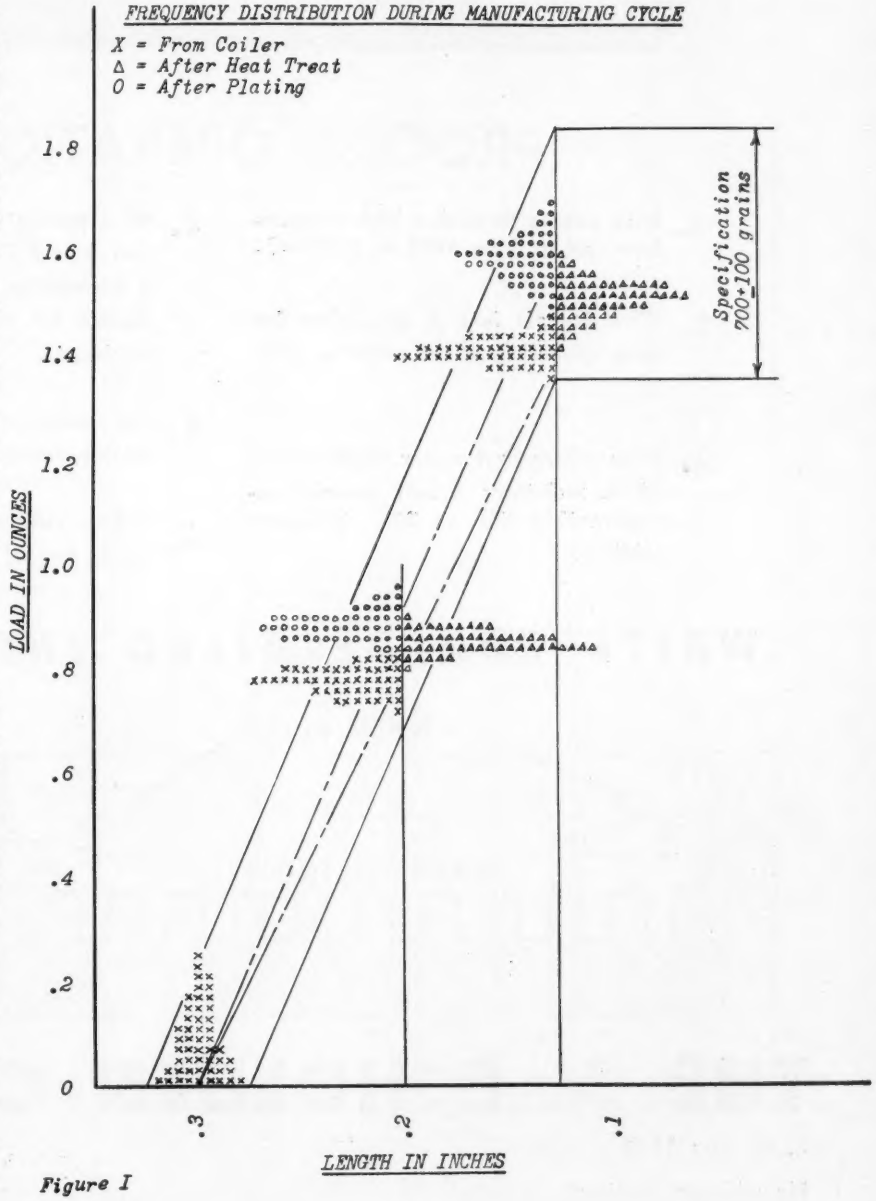
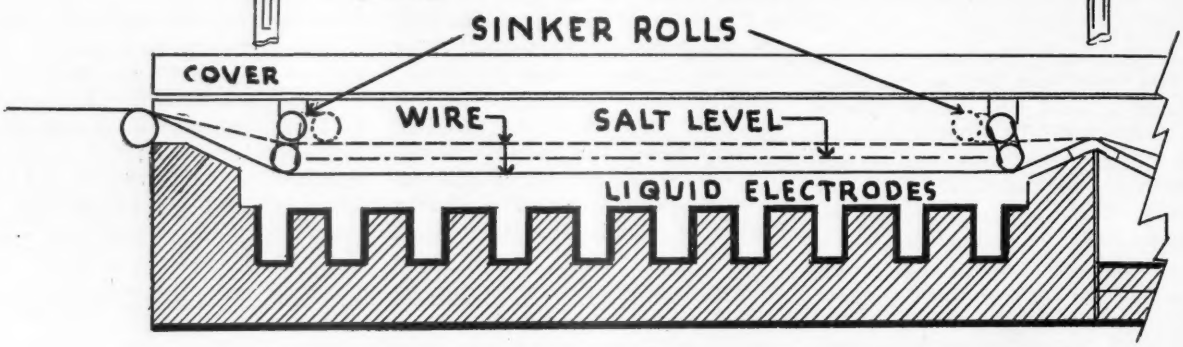


Figure I

SCALE — FREE

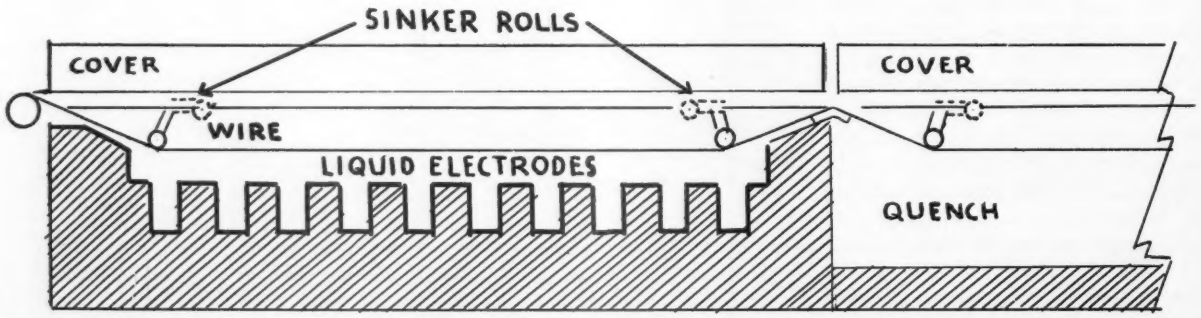
Holden Liquid Electrode Furnace covered by U. S. Patent #2512206. Salt baths for both high heat and quenching furnaces covered by two U. S. patents issued. Other patents pending.



PROCESS OPERATIONS:

1. Wire passes through a high temperature salt at from 1500 to 1700° F.
2. Wire travels into a quenching furnace operating at from 800 to 1000° F.
3. Wire enters first water wash station which maintains a salt content approximating 5% to 20% in water solution.
4. Wire passes to second washing station, where a zinc phosphate coating is formed on the wire to act as a vehicle for carrying soaps or other lubricants.
5. Hot water tank dissolves off any soluble salts. These go to drain.
6. Drying station is optional—depending on size of wire.

WRITE FOR DETAILED INFORMATION



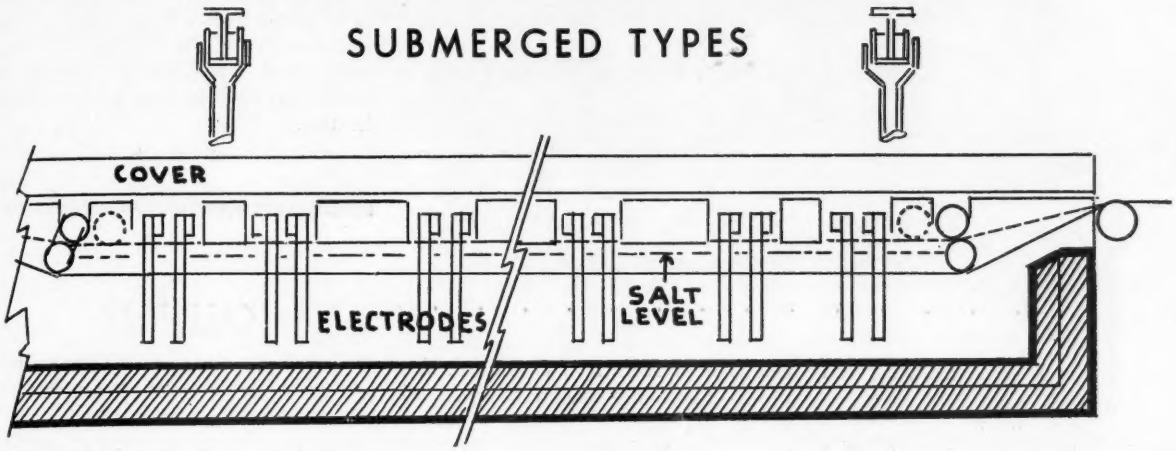
THE A. F. HOLDEN COMPANY

P. O. Box 1898
New Haven 8, Conn.

11300 Schaefer Highway
Detroit 27, Michigan

WIRE PATENTING

SUBMERGED TYPES



BENEFITS OF PROCESS:

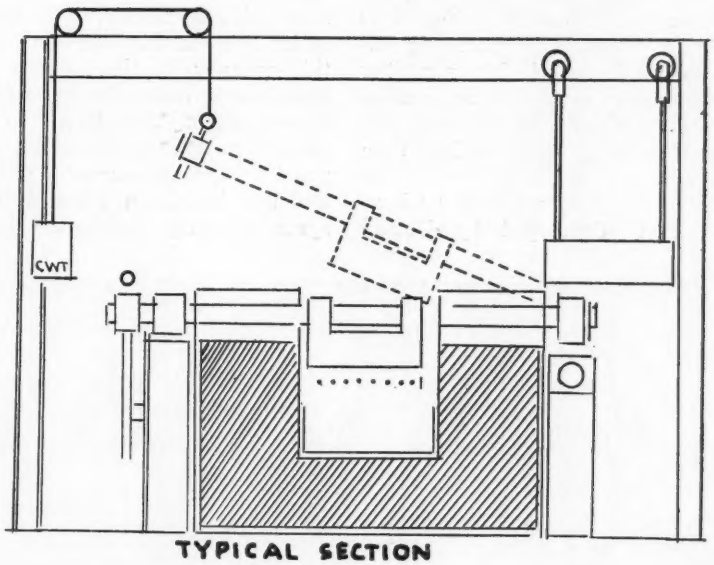
...Complete elimination of acids.

...No lime coating or other alkali agents required.

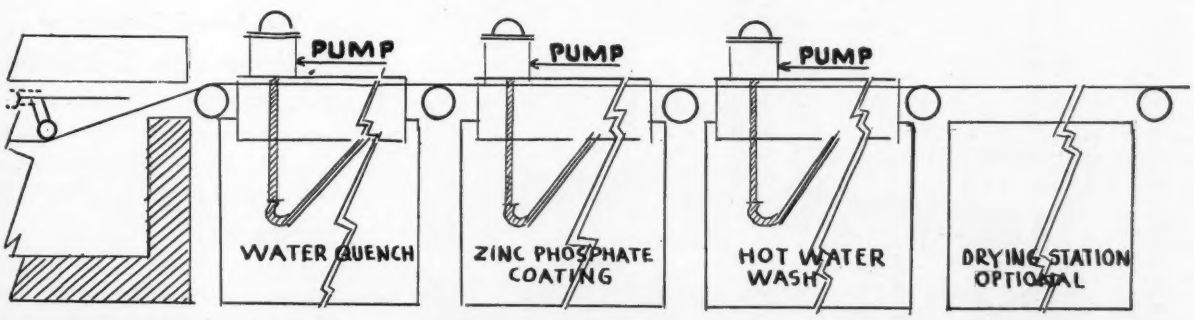
...No hydrogen embrittlement.

...Less float of wire required to operate a plant where wire can go directly from takeoff blocks to draw bench.

...Manufacturing costs are no greater —and usually lower—than present methods.



TYPICAL SECTION



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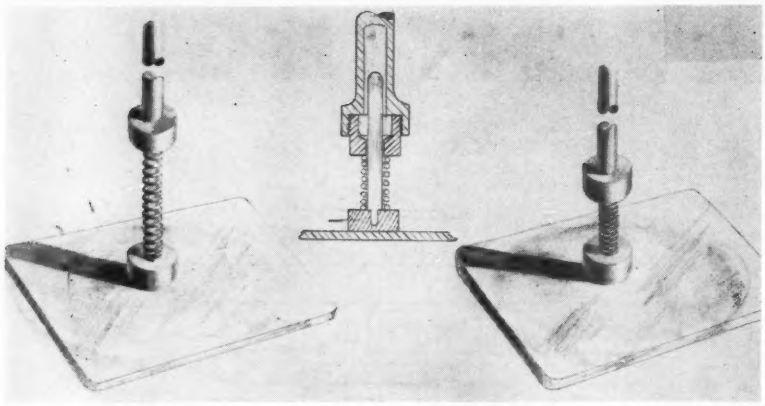

Fig. 3—

spring to do a specific task, as well as in routine testing.

★ ★ ★

Another important use of the variable tester is in incoming inspection for buyers of springs. The attribute method of checking involves single or double sampling methods that require a large number of samples to insure conformance to quality levels of less than 2%. With the use of the tester and variable sampling methods such as "Lot Plot" developed by Dorian Shainan of Hamilton Standard, the number of samples can be reduced to an appreciable extent. In some cases, the savings can be as great as 90%, but usually will run at least 50%. In addition to the amount of information that can be obtained, this manner of checking is more beneficial to both producer and consumer alike. The trend in economical sampling procedures is toward the use of variable methods, but this has been delayed in the spring industry due to the lack of an appropriate tester which fulfills the foregoing requirements.

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The testers have been developed to a point where they can be used universally in the design, development and checking of almost all small coil springs that are presently in use.

★ ★ ★

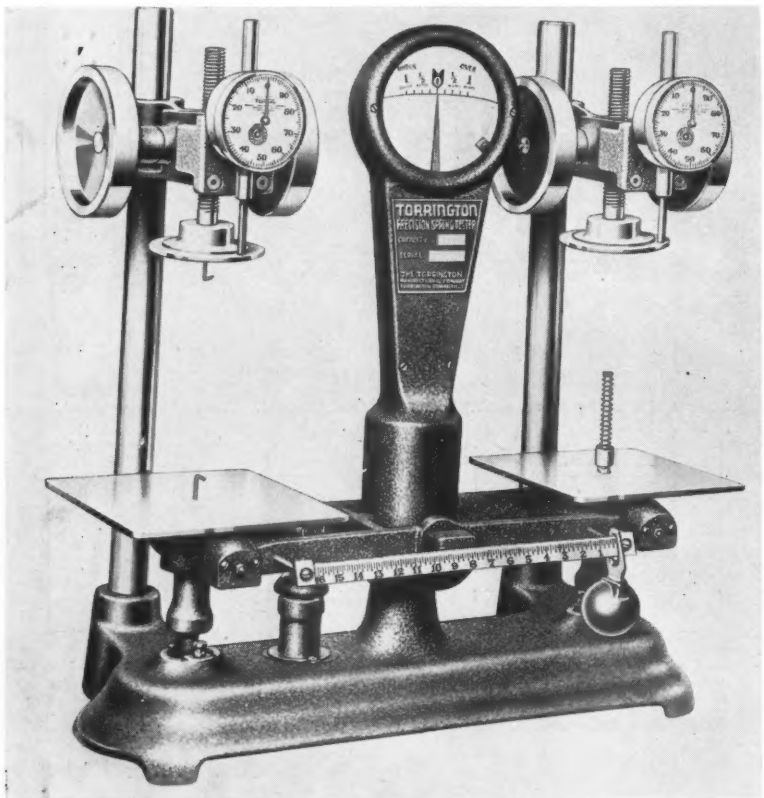

Fig. 2—

CALENDAR OF COMING EVENTS

Pittsburgh Regional Meeting

at the William Penn Hotel, May 8 & 9, 1952. The detailed program is printed on page 134 of this issue. You won't want to miss this meeting. The technical sessions, the two plant visits and the banquet will all be well worth your while.

Los Angeles Regional Meeting

The meeting on the Pacific Coast will be held during the forepart of June. A program is being arranged now by a local committee that promises to assure a lively and interesting meeting. Watch for details in the March issue.

The Annual Convention

This will be held in Cleveland this year, November 10-14, with headquarters at the Carter Hotel. Please note the change from October to November. Full details to be announced later.

THE WIRE ASSOCIATION

453 Main St. • Stamford, Conn.

Making Satisfactory Welded Joints in Wire by Resistance Welding

by the Technical Staff

The Taylor-Winfield Corporation
Warren, Ohio

So little has been written on the subject of spot welding of wire, that this article, the result of considerable research and experimental work on the part of The Taylor-Winfield Corporation, will be found of practical usefulness in wire welding operations in the making of wire products.

Introduction

The joining of crossed steel wires by resistance welding is not new. It is, in fact, one of the earliest uses to which resistance welding equipment was put. Welds of this kind, being inherently simple, have been so easy to make that little attention has heretofore been given to the study of the underlying principles and factors that should be understood if welded joints of optimum quality are to be produced.

★ ★ ★

Research is more often conducted to find solutions to the more difficult and complex problems. This may explain why so simple a project as the study of crossed wire welds has not been undertaken before. The results of extensive research in our laboratories is set forth here in order that wire product fabricators may follow simple rules and thereby secure the best possible welded joints at the lowest possible cost—an understanding that has proven of practical value both to the manufacturer and to many users of welding equipment.

★ ★ ★

In uniting crossed wires in the forming of wire products such as trays, racks, soap dishes, lamp shades, baskets and so forth, good clean joints are essential for the sake of both strength and appearance.

★ ★ ★

Resistance welding, a method for achieving this end, is an excellent means of joining crossed wires, where the wires are overlapped and crossed at approximately right angles. The information furnished here is designed to provide wire product fabricators with data on modern techniques that will enable them to turn out satisfactory work and to make tests that will assure continuously consistent results. A typical machine for multiple welding is shown in Fig. 1.

★ ★ ★

The materials considered are cold and hot drawn low carbon steel wire, where "low carbon" is taken to mean a steel of not more than 20% carbon, generally referred to as "mild steel". Low carbon steel has a wide "plastic range", meaning that there is a wide range of temperature and force that can be used to cause the parts to become properly fused together. Because of this wide "plastic range" a blacksmith can readily forge-weld low carbon steel. In spite of the ease with which this steel can be welded, certain known combinations of the variables can produce the highest possible quality of weld, with consistency, with high speed and with a minimum of maintenance on the electrodes used in the resistance welding process.

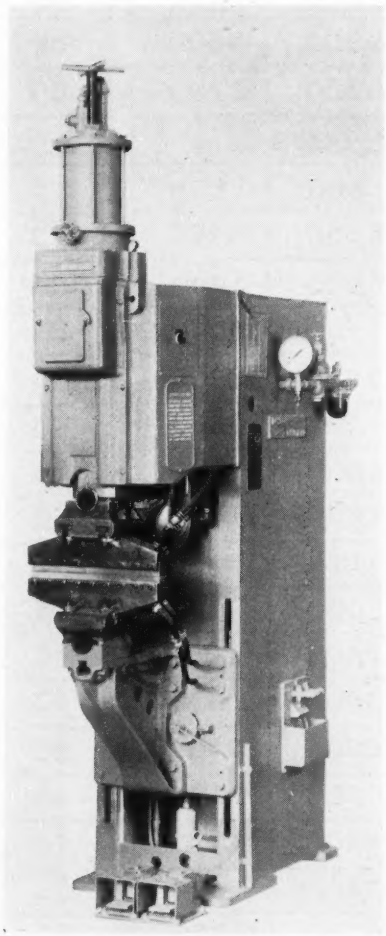

Fig. 1—Typical electrode holders and electrodes for crossed wire welding.

★ ★ ★

In the Welding Data Chart (Fig. 2), those best combinations of time, force and current are tabulated. Such a chart of necessity cannot cover all wire welding jobs and conditions, but it does embody many of the more common types and sizes of wire. For special circumstances, any field representative of the welding machine manufacturer is qualified to advise on efficient procedures. In the Welding Data Chart, cases of welding crossed wires of equal diameters only is given, but the proper set-up for two wires of unequal diameters will be very close to that required by the smaller diameter wire.

★ ★ ★

It should be pointed out that the chart only provides data for the making of single welds. To use these data for making multiple welds, use the welding time given for a single weld, but multiply the welding currents and forces by the number of welds to be made simultaneously. This will give the required welding current and force needed. These data are based on experience derived from the making and testing of hundreds of welds.

★ ★ ★

WELDING DATA CHART

CROSSED WIRE WELDING OF LOW CARBON STEEL WIRE

WIRE DIA. IN.	COLD DRAWN WIRE				HOT DRAWN WIRE			
	WELD TIME CYCLES	WELD FORCE LBS.	WELD CURRENT AMPS.	WELD STRENGTH LBS.	WELD TIME CYCLES	WELD FORCE LBS.	WELD CURRENT AMPS.	WELD STRENGTH LBS.
	15% SET-DOWN				15% SET-DOWN			
1/16	5	100	600	450	5	100	600	350
1/8	10	125	1,800	975	10	125	1,850	750
3/16	17	360	3,300	2,000	17	360	3,500	1,500
1/4	23	580	4,500	3,700	23	580	4,900	2,800
5/16	30	825	6,200	5,100	30	825	6,600	4,600
3/8	40	1100	7,400	6,700	40	1,100	7,700	6,200
7/16	50	1,400	9,300	9,600	50	1,400	10,000	8,800
1/2	60	1,700	10,300	12,200	60	1,700	11,000	11,500
	30% SET-DOWN				30% SET-DOWN			
1/16	5	150	800	500	5	150	800	400
1/8	10	260	2,650	1,125	10	260	2,770	850
3/16	17	600	5,000	2,400	17	600	5,100	1,700
1/4	23	850	6,700	4,200	23	850	7,100	3,000
5/16	30	1,450	9,300	6,100	30	1,450	9,600	5,000
3/8	40	2,060	11,300	8,350	40	2,060	11,800	6,800
7/16	50	2,900	13,800	11,300	50	2,900	14,000	9,600
1/2	60	3,400	15,800	13,600	60	3,400	16,500	12,400
	50% SET-DOWN				50% SET-DOWN			
1/16	5	200	1,000	550	5	200	1,000	450
1/8	10	350	3,400	1,250	10	350	3,500	900
3/16	17	750	6,000	2,500	17	750	6,300	1,800
1/4	23	1,240	8,600	4,400	23	1,240	9,000	3,100
5/16	30	2,000	11,400	6,500	30	2,000	12,000	5,300
3/8	40	3,000	14,400	8,800	40	3,000	14,900	7,200
7/16	50	4,450	17,400	11,900	50	4,450	18,000	10,200
1/2	60	5,300	21,000	14,600	60	5,300	22,000	13,000

Fig. 2—

Should weld data for other metals like 18-8 stainless steel or monel wires be desired, similar information can be set up by using the table given below:

	18-8 Stainless	Monel
Welding Force—Multiply low carbon values by	2.5	2.
Welding Current—Multiply low carbon values by	.6	1.
Welding Time—Multiply low carbon values by	1.0	1.

These two metals require closer control of all the welding variables to obtain the highest weld quality, than is needed for a similar quality in low carbon steel.

★ ★ ★

Preparation of Stock

Prior to welding it is necessary that the rods or wire be properly cleaned. Stock should be free from dirt, rust, heavy grease or other coatings, such as phosphate coatings and so forth, or inclusions will occur in the joint that will weaken it. Stock that has been coated with zinc or other metals can be welded, but special consideration must be given to such coatings in setting up the machine for welding operation. Light oil films, such as result from the prior use of anti-rust compounds that may have been applied to prevent rusting in storage or shipping, need not be removed, provided dust and dirt have not been allowed to accumulate on the wire or rod surfaces.

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In setting up the work for welding, the preparation of the stock and the design of the finished product must both be taken into consideration. Space must be provided for the electrodes to make proper contact with the wires. Welds should not be made less than a dimension of one wire diameter from the end of the smaller wires to be welded. If the product requires less than the extension of one wire diameter, the end of the wires will have to be trimmed after welding.

★ ★ ★

Setting Up the Welding Machine

To secure a satisfactory weld on crossed wires certain precautions in setting up the machine should be kept in mind and carefully followed. These points are: 1) strength, appearance and set-down; 2) welding electrodes; 3) welding force or pressure; 4) welding time; 5) welding current or heat; and 6) weld testing.

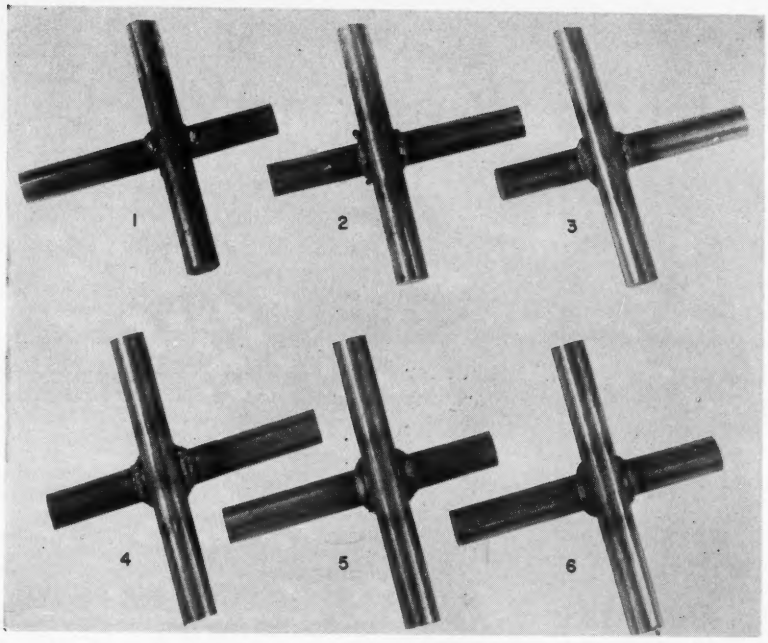

Fig. 3—Effect on appearance of a gradual increase (1 to 6) in Welding Force. * * *

They are discussed in detail in the following paragraphs.

★ ★ ★

1. Strength, Appearance and Set-Down

A good welding job embraces all of these factors in the finished job; the machine must be set up and the stock properly prepared if they are to result satisfactorily. A pleasing appearance and high strength are certainly essential in a product that must be sold and from which good service will be expected.

★ ★ ★

In Figure 3 will be seen the effects of varying the welding force.

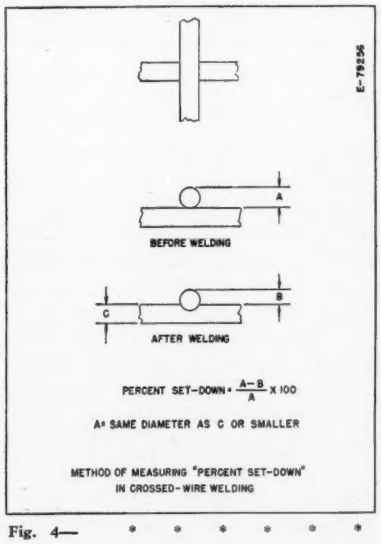

Fig. 4— * * * * * *

With just the right pressure provided initially, a good clean, strong weld can be anticipated. The pressure, heat and time elements will depend upon the number of wires or rods to be welded at one time, as previously pointed out. The measure of these factors is called the "percent set-down" and is calculated in terms of wire diameters as indicated in the formula and other data given in Figure 4.

★ ★ ★

2. The Welding Electrodes

These must be made of the proper material, embody a shape that will fit the work and have provision made in them for water cooling. Suitable electrodes will be furnished by the machine manufacturer. Class 2 alloy electrodes, as classified by the Resistance Welding Manufacturers Association, are the dies that are usually used for crossed-wire welding. These electrodes should give the best results and longer life expectation. Electrode facings of harder alloys, however, are sometimes used for special applications. The proper selection of the electrodes is an important step toward getting good results.

★ ★ ★

A flow of water of approximately 1 to 1½ gallons a minute is essential to the maintenance of maximum electrode life and the securing of

(*Please turn to page* 210)

Standard Costs in Wire Cloth Manufacture

by W. S. Hildebrand
Chief Accountant, Mount Wolf (Pa.) Plant,
American Wire Fabrics Corporation
Mount Wolf, Pa.

The production of wire cloth for insect wire screening is perhaps one of the least-heralded industries despite the fact that it has contributed a good deal to the health and comfort of the public. There are fourteen principal producers of wire cloth for this purpose in the United States, operating, in total,over 4,000 looms. Since the various items going into wire screening are not numerous, the cost accounting procedure lends itself very readily to the use of standard costs. They are in use by the company the experience of which forms the background for this paper. The plan of this article is to offer, first, a certain amount of information on the technical side of the industry and then to proceed to the accounting side.

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Product and Materials

The recognized varieties in fabricating are 16 x 16 mesh, 18 x 14 and 18 x 18 mesh in steel, bronze, copper or aluminum. Gradations of mesh in terms of numerals (as above) are generally accepted as meaning the number of open spaces per linear inch in both warp and filler directions. The standard gauge of steel, bronze and copper is .011. While aluminum may be varied, the general practice is to use .013 gauge for this purpose. Some wire cloth plants draw their own wire but, in this article, it is assumed that the wire is purchased from an outside supplier.

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Besides wire, the principal raw materials involved in insect wire screening manufacture are zinc, paints, bungs and cartons or papers. An appropriate cost center setup, detailed in process order, is as follows:

Spool winding.
Warping winding.
Bobbin winding.

The technical background of wire cloth processing is given attention in this paper, which then proceeds to describe the construction of standards for the corresponding elements of cost. The employment of these standards in costing is then briefly summarized.

The paper was originally published in the Bulletin of the National Association of Cost Accountants in 1951, and is reproduced herewith for the benefit of those of our readers who are engaged in the manufacture of wire cloth through the courtesy of the N.A.C.A.

Weaving and auxiliary operations.
Electro-galvanizing.
Painting.
Inspecting and wrapping.

★ ★ ★

Winding and Weaving Operations

The spool winding operation consists of winding the wire from coils to standard size spools for delivery to the warp racks. Despite changes in the manufacture of spool wire, a great deal of it continues to be produced in eight inch diameter coils weighing approximately 20 pounds each. These coils are received in barrels containing approximately 800 pounds of wire. Upon receipt, a pre-numbered material requisition tag with a perforated edge is stapled on the barrel by the receiving department. The tag shows the number of pounds, gauge and grade.

★ ★ ★

Upon delivery of a barrel to an operator, as directed by the spool winding foreman, the tag is torn off at the perforation and sent to the office, where a wire record book is maintained and where all wire receipts are recorded by requisition tag numbers and weight. Poundage turned in for wire used daily is crossed off this record. Open items form a perpetual inventory of wire in stock. Since the spooling operation is on a piece-work basis (the operator is paid for the number of pounds run), the foreman also maintains a record of the number of pounds delivered to each operator and this record is turned in to the payroll department for pay purposes.

★ ★ ★

The spools delivered to the warp winding department contain approximately 30,000 lineal feet of wire each. They are placed in a warp rack and the ends brought up to a warp which is then wound with a standard number of lineal feet of wire, depending on the mesh. The number of wires wound on each warp is governed by the width of the cloth desired. As an illustration, a 30 inch width of 18 x 14 mesh requires 540 wires (30 times 18, the number of wires per inch of warp).

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The bobbin winding operation is similar to the spool winding operation except that the wire is wound on a round bobbin about three inches in diameter which is eventually placed in the loom to lay in the filler wires.

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There are some variations among plants as to the number of looms operated by a weaver. A proper working assumption is that one weaver operates twelve looms. His duty is primarily that of replacing empty bobbins with full ones and splicing small breaks of several wires when necessary. Within the weaving category there are several auxiliary productive operations. These include threading, loom fixing, tension adjusting, and removing of the finished cloth.

★ ★ ★

Threading is the process of working each warp wire through a heddle and a reed. Common practice is to do this operation on what is generally called a "buck". This method prevents a loom being idle

for threading, as would be the case if the warp were placed in the loom and then threaded.

★ ★ ★

Loom fixing is definitely not loom repairing. A loom fixer sets the loom for the proper size and speed and "fixes" thread breaks or "wrecks" of major proportions, **i.e.,** involving more than several wires. Fixers are generally assigned a definite number of looms. Tension adjusting is also an operation in line with setting a loom for its proper functioning. A tension man falls into the same general classification as a loom fixer.

★ ★ ★

Removal of the full rolls, which are usually taken off at approximately 1,000 lineal feet, is done by clothmen who measure and weigh the rolls and record on a scale sheet the tag number, mesh, width, grade, weight and lineal feet. These scale sheets then constitute a production record from which a daily and monthly accumulation is made for eventual accounting purposes.

★ ★ ★

Two methods of wage payment are in use for productive labor. As has been noted, spool winding is on a piece-work basis. So also is bobbin winding. Warp winding could be placed on piece-work but is considered here as hour rate work. The same is true of weaving and auxiliary operations.

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Finishing the Cloth

The remaining operations relate to the wire cloth after it has been removed from the loom and, prior to inspection, are alternative processes. These operations are finishing ones and include (1) electro-galvanizing with (in some cases) lacquering and (2) painting.

★ ★ ★

If the product is steel wire cloth (rather than bronze, copper or aluminum) the next step is the electro-galvanizing process. Here is where zinc comes into use as a principal raw material.

★ ★ ★

In the instances in which unfinished steel cloth is scheduled for a paint finish instead of electro-galvanizing, it is diverted to a painting department where a standard mixture of paint (usually consisting of a paste together with varnish and naphtha) is applied by running the cloth through vats and then through a heating tower for drying purposes.

★ ★ ★

After all cloth has received a protective finish, it is delivered to the inspecting and wrapping department where it is wound into standard size rolls, usually consisting of 100 lineal feet, for the hardware trade and mill length rolls of between 200 and 300 feet for window screen and door screen manufacturers.

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Categories of Overhead

In the winding and weaving operations, the major portion of overhead is charged to the cost centers to which it is applicable. Most of the items of expense are self explanatory and the charges (from requisitions, payroll or voucher register) can easily be applied to the proper account. Indirect labor, for instance, would include foremen, janitors, and any other labor items not chargeable to direct labor or repairs. A mill service account is used to carry charges for general repairs, property taxes, property insurance, etc., the total of which may be prorated to cost centers either on an area basis or direct departmental labor, which ever seems the most logical in the particular instance.

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The overhead categories involved in the finishing operation, i.e., electrogalvanizing and painting are not dissimilar. A mill service account is used here, too, for general plant overhead. The situation is not widely different when it comes to the packing operation.

★ ★ ★

The most common classifications in which overhead falls are represented in the following list:

WINDING AND WEAVING

1. **Losses**
2. **Indirect labor**
3. **Repair labor**
4. **Repair material**
5. **Supplies**
6. —
7. —
8. **Vacation pay roll**
9. **Weavers' incentive bonus**
10. **Floormen's incentive bonus**
11. **Overtime bonus**
12. **Compensation insurance**
13. **F.O.A.B. and unemployment taxes**
14. **Learners' pay**

FINISHING

1. —
2. **Indirect labor**
3. **Repair labor**
4. **Repair material**
5. **Supplies**
6. **Power**
7. **Water**
8. **Vacation pay roll**
9. —
10. —
11. **Overtime bonus**
12. **Compensation insurance**
13. **F.O.A.B. and unemployment taxes**
14. —

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Standard Cost Structure

With the foregoing paragraphs, we have completed brief review of what may be referred to as the substance of the industrial operation which the cost system now to be described is intended to serve. We have enumerated and characterized the winding and weaving operations which result in a semi-finished product, have also made mention of the finishing operations, and have identified the principal items of overhead related, respectively, to winding, weaving and to finishing.

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Attention may now be directed to the setting of standard costs. Throughout, the physical unit used for these standards will be one hundred square feet of cloth. Because electro-galvanized cloth, which emerges from steel cloth as a semi-finished product, is perhaps the industry's principal product, we will deal with a cost construction for woven but unfinished steel screening.

★ ★ ★

Wire Cost Standards

Weight per hundred square feet of each mesh is first determined. Assuming that this calculation has been made on 18 x 14 mesh and that the average weight per hundred square feet turns out to be 12.8 pounds, the standard material unit cost will be the product of this figure times the per pound cost of steel wire.

★ ★ ★

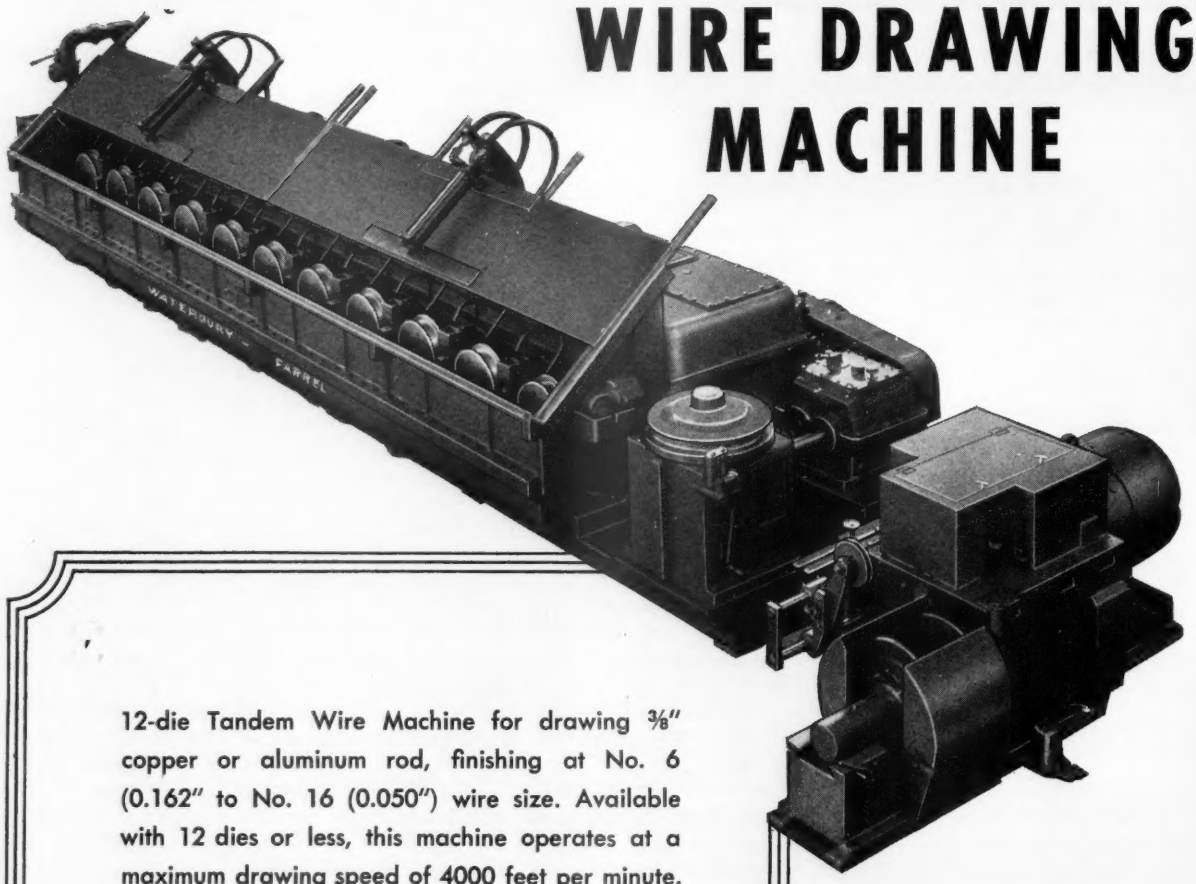
Winding and Weaving Labor Standards

The first labor operation, as previously outlined, is spool winding. Since the piece-work rate per hundred pounds for winding spools is known, the average weight of one hundred square feet of the mesh in

(Please turn to page 204)

4000 FEET PER MINUTE

WITH THIS WATERBURY-FARREL 12-DIE TANDEM WIRE DRAWING MACHINE



12-die Tandem Wire Machine for drawing 3/8" copper or aluminum rod, finishing at No. 6 (0.162" to No. 16 (0.050") wire size. Available with 12 dies or less, this machine operates at a maximum drawing speed of 4000 feet per minute.

It can be furnished for drawing on spools, or coils, or as a combination machine for both as shown.

IF IT'S MILL EQUIPMENT... *WE HAVE IT!*

FOUNDED WATERBURY FARREL 1851

THE WATERBURY FARREL FOUNDRY & MACHINE COMPANY

WATERBURY, CONNECTICUT, U.S.A.

CHICAGO, ILL. CLEVELAND, O. MILLBURN, N. J.

THE GILBERT AND BENNETT STORY

Georgetown Woven Wire Mill Has Come A Long Way From An Unsuccessful Cobbler's 1828 Sieve Factory

The wire mill at Georgetown has come a long, long way from an unsuccessful cobbler's sieve factory in 1828. From small beginnings and the varying vicissitudes of its early history, a fine modern and substantial business has been evolved. Prior to 1940, the plant was not only one of the oldest continuously operating wire enterprises in the country, but was still using perhaps the oldest equipment in existence. The transformation that has taken place is little short of miraculous. Today we will find equipment there that is ultra-modern. Some, so up to date that it may not be seen in operation elsewhere. Such is progress!

A monument to the genius of man that straddles time exists in Georgetown. Its story had its beginnings in the colonial days. Its sequences were cradled in horsehair and consummated in steel.

★ ★ ★

Cliffs of buildings, old and new, rise from the roadside in Georgetown, Connecticut, on the property of the Gilbert and Bennett Manufacturing Company. These buildings symbolize a steady growth through a period of nearly 150 years. What goes on at Georgetown today is measured in terms of steel rod tonnage that is being moved from building to building in the process of converting it through manifold processes into products people need —wire screening, poultry netting, fencing and hardware cloth. Each week about 200 tons of metal is handled with a minimum expenditure of human brawn. Electric push-buttons have become the substitutes for brawn, commanding giant fingers of steel to do the heavy work formerly done by hand.

★ ★ ★

Man Against Tonnage

When Benjamin Gilbert and **Sturges Bennett** began to make history some 150 years ago, it was manpower that hoisted, carried and manipulated the raw materials and finished product. Units of work had to be broken down to a size and weight that men could handle. Production continued more or less in this piecemeal fashion until 1940, when a dramatic program of streamlining and modernizing was put into effect.

★ ★ ★

The transition from antique to modern had to be engineered in such a way that production continued to flow unimpeded by the major construction jobs that were taking place at the same time. As men were relieved of their back breaking assignments by the introduction of new machinery, their tasks were changed to work of operating the machines and keeping them running. Along with the building processes that introduced new methods went the process of retaining the personnel to take over under the new set-up.

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In the course of reconstruction the old was retained until the new was ready to be put into operation. Old buildings were engulfed within new construction and their antique machines continued to turn out wire goods to the clang of new steel girders being riveted overhead. New machinery slid into empty spaces that surrounded the old structures and as soon as it was ready to function, the processes were transferred to the modern units and the old were reduced to dust. After the rubble was removed, renovation within the new structure was completed. Thus building after building has been refurbished and enlarged, studded with mammoth windows and equipped with modern machinery.

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The New Engulfs The Old

One new structure alone that surrounds an old one, has added 21,000 square feet of floor space, increasing the total working area of the plant to 401,000 square feet. This new building only recently has been completely equipped with new wire processing machinery. Within this new shell still stands the old building in which painted wire screen has been made since Civil War days. Though dwarfed beneath the lofty roof of the new structure, it still served its old productive purpose. Its own tower reduced today to a Lilliputian relic, once was a focal point on the Gilbert and Bennett acres. It still was used only a couple of years back to dry the screen cloth carried up to it on a moving belt after it had passed through the paint vat below. Most of the old building has been dismantled.

★ ★ ★

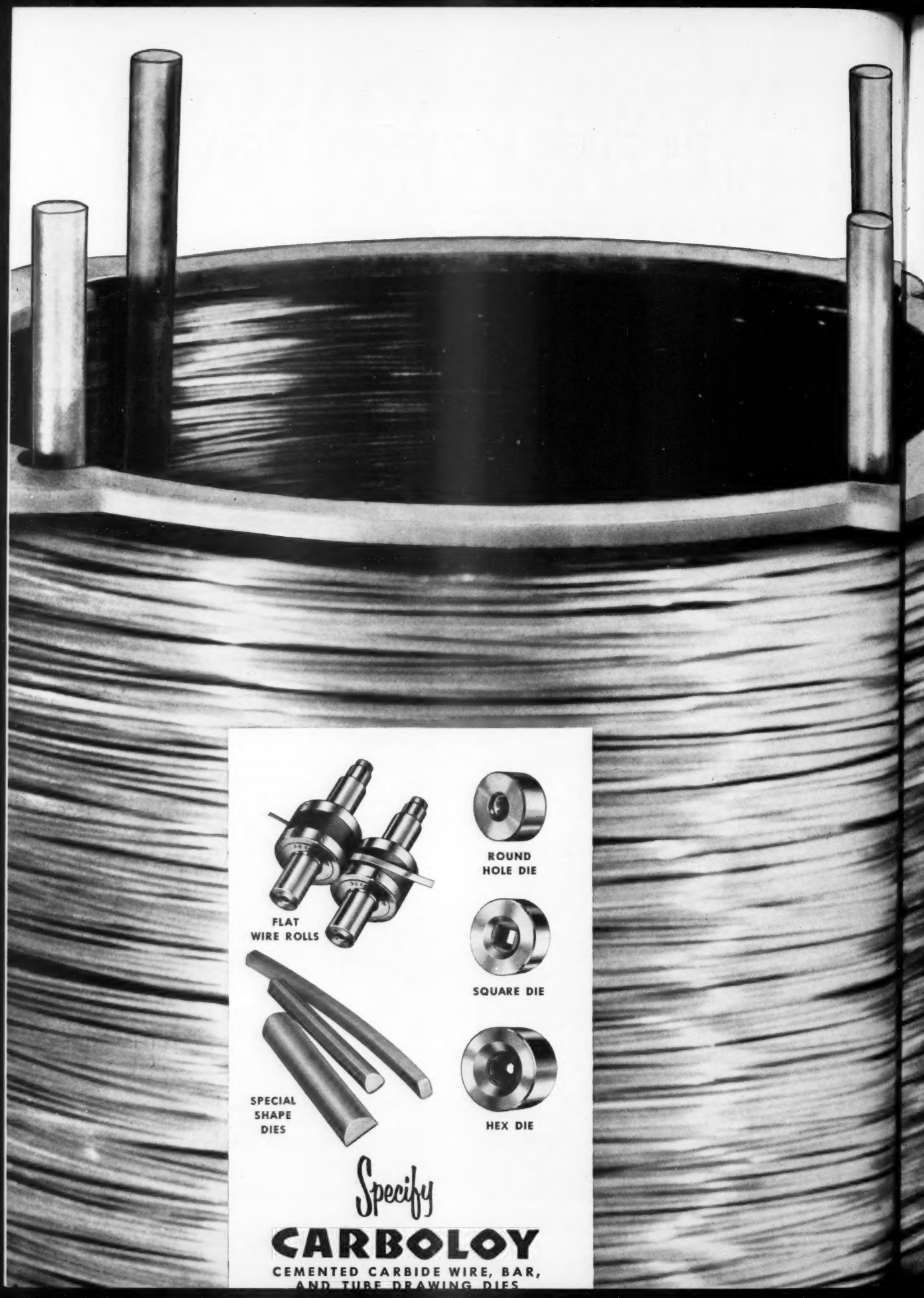
Today the work of making painted screen already has been transferred to modern machines in modern quarters and all that remains of the old building is its time-stained wooden framework. The slim timbers still are allowed to stand because they support a few essential pipes and electric wires. As soon as these are rearranged, the skeleton of days gone by will be removed from its unfamiliar environment and even its memory will be effaced by the symbols of modern efficiency that will replace it.

★ ★ ★

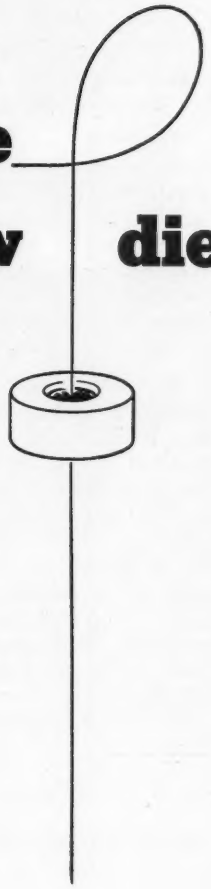
Hotcakes from Happenstance

The story of the painted screen is a story of happenstance. Painted screen was the product of an emergency nearly one hundred years ago. Because of the outbreak of war in the south in 1861, the firm lost important outlets for its one and only product—sieves. On hand was a large supply of wire cloth of which

(*Please turn to page* 199)


FLAT
WIRE ROLLS
ROUND
HOLE DIE
SQUARE DIE
SPECIAL
SHAPE
DIES
HEX DIE
Specify
CARBOLOY
CEMENTED CARBIDE WIRE, BAR,
AND TUBE DRAWING DIES

How to get the *bonus* tonnage from your carbide draw dies



THERE'S BONUS tonnage in *Carboloy* Wire, Tube, and Bar Drawing Dies. We know. We make them of Carboloy Cemented Carbide, *hardest metal made by man.* We design and build every last one with tested extra stamina to give you extra drawing capacity and therefore new highs in die productivity. Then, to help you get from Carboloy Wire Dies everything we build into them, we offer the industry's most complete service program.

Free Carboloy Services

Die Service Centers. Turn baffling die service problems over to your nearest Carboloy Die Service Center, staffed and equipped to give you expert help whenever you need it.

Customer Training School. Train key men in our tuition-free school in 3- or 5-day courses packed with up-to-minute information and ideas that will pay off in saved dollars throughout your die handling operations. Specialists will work with your men on any die problems you may face in your plant.

Field Engineers. Call in your Carboloy Field Engineer as trouble shooter on die service and refinishing problems. He can focus the efforts of Carboloy Die Service Centers, our plants, our laboratories on any die problem you may have.

Technical Literature. Get free Carboloy Die Service Manual D-119. Forty-eight pages deal with die finishing techniques that will minimize downtime, cut die finishing time. Sixteen pages more discuss vital improvements in other phases of die handling.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11171 E. 8 Mile Ave., Detroit 32, Michigan

Government Wire Production Information

Mechanical Springs, Metal Stampings and Screw Machine Products

The Office of Price Stabilization has issued a tailored ceiling price regulation (CPR 119) for manufacturers of mechanical precision springs, metal stampings and screw machine products. The order, Ceiling Price Regulation 119, became effective January 21, 1952.

★ ★ ★

In general, ceiling prices are established under this regulation on the basis of the price determining method which a manufacturer had in effect during the period January 1, 1950 through June 24, 1950, as applied to labor and materials costs as of March 15, 1951. This means that all overhead costs, rates for general administrative and selling expense, profit markup, discounts and allowances, and any other basis of computing prices in relation to costs, which a manufacturer had in effect during the January 1, 1950 through June 24, 1950 period are applicable.

★ ★ ★

Since these products generally are produced in accordance with individual customer's specifications, the type and quantities of materials and labor vary greatly with each job. Therefore, the pricing technique which a manufacturer had in effect during the base period is considered to offer a sound basis for establishing ceiling prices.

★ ★ ★

The regulation exempts certain so-called "small orders" where the total dollar volume of such sales in any calendar quarter does not exceed the total dollar volume of similar sales in the quarter having the highest sales volume during the period February 1, 1950 through January 31, 1951.

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The exemption applies to small orders of less than $200 in the case of mechanical springs; of less than $500 in the case of metal stampings; and of less than $400 in the case of screw machine products.

★ ★ ★

Bolts, Nuts, Screws and Rivets

The Office of Price Stabilization has issued a tailored ceiling price regulation (CPR 118) covering producers of bolts, nuts, screws and rivets. The order, Ceiling Price Regulation 118, became effective January 21, 1952.

★ ★ ★

It is estimated that the regulation covers some 220 producers who manufacture approximately 400,000 different kinds of bolts, nuts, screws or rivets. Some of these producers make a wide range of items, while the output of others is concentrated in relatively few lines. These products are used in every kind of industrial, farm, automotive, transportation and communication equipment and machinery; in household

MICROMETER PRECISION

MICRO-WELD

TRADE MARK REGISTERED

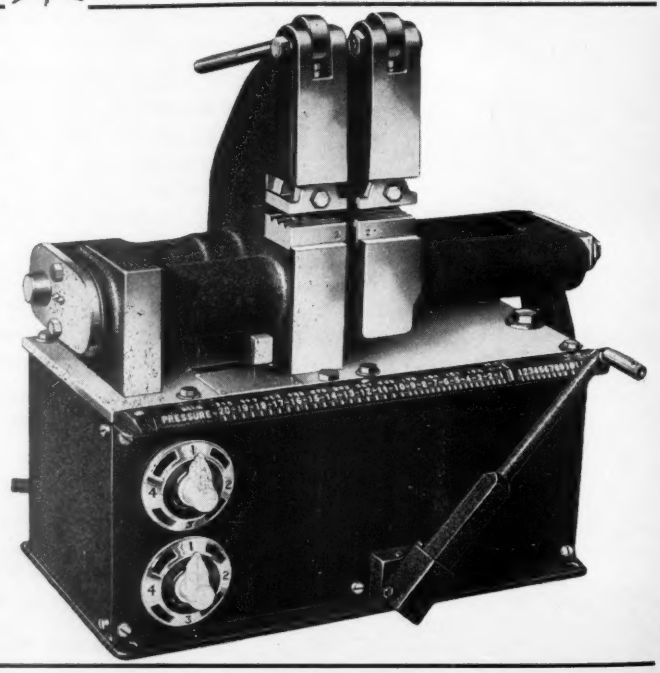
TRADE MARK REG. U. S. PAT OFF.

MODEL T-L MICRO-WELD BUTT WELDER

Welding capacity .080" to .375" diameter STEEL wire

The Model T-L Welder which is a self-contained unit suitable for various types of Butt welding, is equipped with individual hand clamps, and a single control lever for the spacing operation, applying the upset spring tension, and contacting the welding switch.

This unit can be supplied for either bench mounting, overhead crane, or mounted on 4-wheel truck.



MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE,

CHICAGO 6, ILL.

Telephone: STATE 7468

appliances, furniture and furnishings; and in virtually all types of military equipment, large and small.

★ ★ ★

In general, the regulation maintains the level of ceiling prices prevailing during the General Ceiling Price Regulation (GCPR) base period, December 19, 1950, to January 25, 1951, on the basis of prices in effect on January 25, 1951. Information presently available to OPS indicates that, for the industry as a whole, the level is substantially the same as that which would be achieved through application of the pricing formulas provided under the general manufacturers' ceiling price regulation CPR 22.

★ ★ ★

Generally, the new regulation establishes ceiling prices on the basis of published list prices which a producer had in effect on January 25, 1951, subject to the same discounts, differentials, terms, and conditions of sale and delivery which the producer had in effect on that date. In addition, it permits the use of customary pricing formulas (applied on the basis of base period costs) in the determination of ceilings for products which were not sold during the base period. Thus, it will eliminate some of the pricing problems and difficulties experienced under the General Ceiling Price Regulation (GCPR).

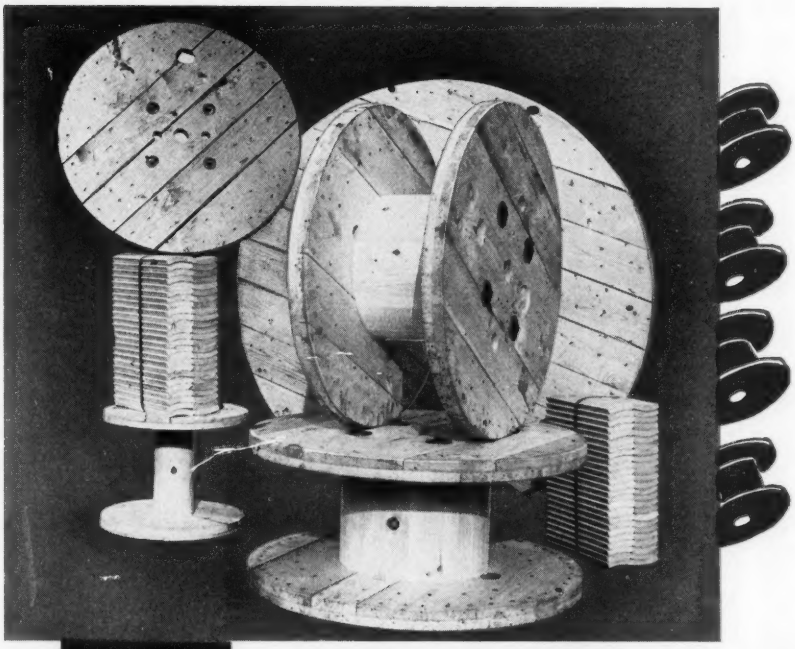
★ ★ ★

CPR 118 covers a wide range of industrial fasteners made from ferrous and nonferrous metals and includes, under the general term "bolts, nuts, screws or rivets", blank bolts, wood screws, threaded studs, and miscellaneous headed, threaded, punched, bent or cut off products. The term **does not include** explosive rivets, wire nails, cut nails, cut tacks, brads, cotter pins, washers, pipe fittings, pipe plugs (other than socket pipe plugs), solid and flexible staybolts, and expansion or toggle bolts when sold with shield or expansion nuts.

★ ★ ★

More Copper Coming

More than 1,000,000 pounds of copper per month will be added to the supply available to industry for defense purposes, under terms of a contract announced by Jess Larson,



FOR CABLE ROPE WIRE

ALL SIZES AND TYPES.
SHIPPING AND SHOP REELS.

WOOD REELS

RETURNABLE AND NON-RETURNABLE

BRIDGE REELS are LOW IN COST, RUGGED in CONSTRUCTION for SEVERE HANDLING, and WELL MADE.

Our trucks will deliver reels to your door if you are within 200 miles of Hazardville. Fast freight service will reach points as far away as St. Louis in 4 or 5 days. Even better deliveries to points like Buffalo and Cleveland. If shipped via fast LCL rail service, reels will be delivered to your door in some cities at no extra cost.
Look into BRIDGE'S unique distribution service. Let us show you what we can do for you.

SIZES: FROM 12" to 96" IN DIAMETER

ALSO, REEL HEADS FOR STEEL DRUMS

Our streamlined production methods give you reels of the best possible construction at costs that represent real savings. This, plus our unique distribution system, offers you a dependable, efficient source of supply for your reels.

Reels are furnished knocked down or assembled. Standard sizes in stock, special reels made to your specifications on short notice.

REELS for quality and service.

BRIDGE
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Phone Thompsonville, 3375

quote on your reel needs.

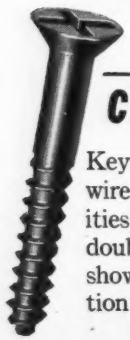
SKILLED MEN and EFFICIENT MACHINES . . .

Highly efficient wire drawing machine designed and made by Keystone to insure better products at lower cost. Harry Goodin, a member of the 25 Year Club, is the operator.

at your SERVICE!

Practical experience and special skills guide the hands and counsels the thinking of the men who operate Keystone's custom-made equipment. Does your product require wire of special analysis, finish, temper for unusual fabricating? Whatever the need, there is a Keystone custom-drawn specialty wire to keep your production flowing smoothly. You can depend upon it!

KEYSTONE



"SPECIAL PROCESSED"

COLD HEADING WIRE

Keystone's "special processed" cold heading wire has uniform upsetting and forming qualities plus excellent flow properties which often double plug and die life. Production reports show less waste, fewer rejects, reduced inspection time and a higher quality finished product.

Keystone Steel & Wire Company
PEORIA, ILLINOIS

More SCRAP today . . . More STEEL tomorrow!

Administrator of the Defense Materials Procurement Agency. The agreement is between DMPA and the Calumet and Hecla Consolidated Copper Company, of Calumet, Michigan.

★ ★ ★

The Government will pay over-the-ceiling prices for the copper because otherwise the deposits would be shut down and the production lost due to cost factors. The urgent necessity to bring more production into play at once, plus a careful review of the costs involved to the company in working these properties, led to the decision to pay over the ceiling prices.

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Copper Industry Advisory Committee Meets

The Copper Industry Advisory Committee to the Defense Materials Procurement Agency met during January in Washington to consult with the Government in its program to alleviate the severe shortage of copper.

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Made up of representatives of producing companies, smelters and copper importers from all areas of the United States, the committee advises DMPA in its program to increase both the domestic and foreign supply of copper.

★ ★ ★

Howard I. Young, Deputy Administrator of DMPA, described the present copper supply situation as "extremely serious" and urged the committee to present suggestions that would help step up production of the metal to a point where defense needs could be met and civilian production could be kept at a high level for the economic welfare of the nation.

★ ★ ★

The committee recommended that DMPA continue its recently announced policy of negotiating individual over-the-ceiling contracts with operators of presently producing high cost mines as a means of keeping production at its present level.

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The meeting was devoted to extensive discussion of the effect of the present dual price structure, tax regulations, increasing costs of production and manpower problems.

★ ★ ★

Copper Wire Products Now Under CPR110

Copper wire mill products, as of December 26, 1951, became subject to pricing regulations under a new order entitled Ceiling Price Regulation 110. This order sets ceilings for these products at levels generally recorded during the base period from December 19, 1950 to January 25, 1951. There will be both increases and decreases in prices resulting from the order.

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Another order, Amendment 26 to CPR30, removed from that regulation insulated electric wire and cable and some other copper wire mill products now covered by CPR110.

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Subject Index to Bibliography of Technical Reports, Vol. 15

Volume 15 of the **Bibliography of Technical Reports** (January-June, 1951) is now indexed according to subject, the Office of Technical Services of the U. S. Department of Commerce announced recently.

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The new index is the thirteenth to be issued by OTS. Volumes 8 and 9 still remain to be indexed.

★ ★ ★

Copies of the Subject Index to Volume 15 may be purchased from the **Office of Technical Services of the U. S. Department of Commerce,** Washington 25, D. C., at $1 per copy. Still available from O. T. S. at $1 each are the indexes to Volumes 6, 7, 11, 12, 13 and 14. Check or money order payable to the Treasurer of the United States should accompany all orders.

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Each month, the Office of Technical Services releases officially through the **Bibliography of Technical Reports** additions to the 150,000-document OTS collection of foreign and domestic reports. Together with the "Technical Reports Newsletter", the Bibliography helps to provide U. S. business firms with the highlights of federal and nonconfidential technical research.

★ ★ ★

Cover non-metallic sheathed cable and weatherproof wire

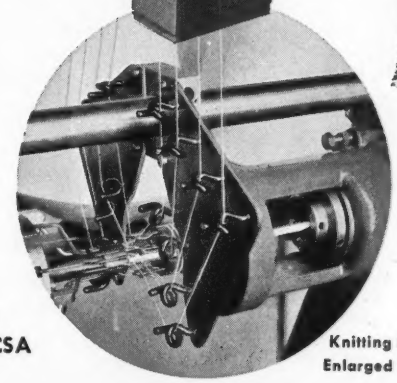
1800 feet an hour

with

***Fidelity* SINFRA KNITTERS**

Model C-3H Knitter & Haul-Off Reel Stand

- ★ Increase speed 10-15 times
- ★ Save on cost of yarn
- ★ Boost labor output 600%
- ★ Eliminate yarn rewinding
- ★ Conserve floor space
- ★ Cut maintenance costs
- ★ Reduce power requirements
- ★ Minimize operating noise
- ★ Improve working conditions
- ★ Provides automatic control
- ★ Lower your capital investment
- ★ Approved by UL, ASA, AAR, CSA



Knitting Head Enlarged View

This *Fidelity Sinfra* Wire Covering Machine offers you high production speed and low operating cost. The output of *one* Knitter equals 15 conventional machines. Savings in yarn costs and direct labor alone pay for this new equipment in 12 to 24 months. Knit products are universally used and meet all standards.

The modern Fidelity Sinfra method uses fewer yarns and large 3 pound cones located on a stationary creel. High-speed, rotating Knitting Heads cover the wire at 30 or more feet per minute. Design permits horizontal operation at convenient working level with no crawling or stretching. Automatic electric stop motions and other advanced features cut maintenance and down time.

To see why top companies choose Fidelity, read our literature proving its advantages. Write today for Catalog W.

Manufacturers of intricate precision machinery since 1911

FIDELITY MACHINE COMPANY INC.

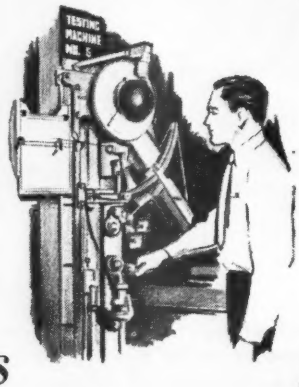
3908 FRANKFORD AVE. • PHILADELPHIA 24, PA.

Quality . . .

the "Keynote" behind all

JOHNSON

Specialty Wires



Not only Music Wire, "the wire of a thousand uses," but a complete line of quality specialty wires is made by Johnson, including vacuum hose wire, aircraft cable wire, high carbon rope wire, hard drawn spring wire, oil tempered spring wire, high tensile galvanized steel wire, hose reinforcement wire (braided type), flat and half oval special spring wire, brush wire for hand and power brushes.

"Johnson Sets the Standard of the Industry"

JOHNSON

JOHNSON STEEL and WIRE CO., INC.

Worcester 1, Massachusetts

New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

Office of Aluminum Created by DPA.

Creation within DPA of a new Office of Aluminum, headed by **Samuel W. Anderson** as Deputy DPA Administrator for Aluminum, has been announced by the **Defense Production Administration.**

★ ★ ★

Designed to assure a supply of aluminum to meet both defense and essential civilian requirements, the Office of Aluminum has the following functions:

Development of new expansion programs for bauxite, alumina, aluminum, aluminum fabrication, secondary smelting, and cryolite;

★ ★ ★

Negotiation for expansion programs with producers and processors of bauxite, cryolite, alumina, and aluminum;

★ ★ ★

Review the expansion of facilities for the production of petroleum, coke, fluorspar, soda ash, caustic soda, and sulfuric acid;

★ ★ ★

Review of the requirement for aluminum submitted by all claimant agencies;

★ ★ ★

Review for clearance of decisions affecting the aluminum stock pile.

★ ★ ★

Deputy Administrator Anderson came to Washington in 1941 with the Office of Production Management and later was named Program Vice-Chairman of the War Production Board and Chairman of the Requirements Committee.

★ ★ ★

New Dielectric Developed by DuPont

Properties of "Mylar" polyester film, with a wide range of uses in the electrical industry, were described at the winter meeting of the American Institute of Electrical Engineers.

★ ★ ★

The new film, which resembles cellophane in appearance, has unique electrical, physical, and chemical properties, combining exceptionally high mechanical strength with good dielectric, or insulating, properties over a wide temperature range.

It has a tensile strength of 25,000 pounds per square inch, equivalent to about one-third that of high-strength steel. Its impact strength is at least twice that of any known commercial film. As an insulator, it can be used in surrounding temperatures as high as 200° C. (392° F.) and as low as minus 50° C. (minus 58° F.), and at the same time exhibit the above qualities.

★ ★ ★

Among the electrical uses suggested are: As a capacitor dielectric, "Mylar" polyester film's combination of high mechanical strength with high dielectric strength in extremely thin sections should result in a decided space saving. Its ability to operate at high temperatures will make it possible for capacitor manufacturers to enter many fields of end use, which have been inaccessible before because of temperature limitations of conventional capacitor dielectrics.

★ ★ ★

Many properties recommend the film for use as a motor and generator insulation. Notably, its insensitivity to moisture should greatly simplify the design and assembly of motor and generator units.

★ ★ ★

"Mylar" offers savings in space and in production time and cost on such operations as coil winding and wire wrapping. Its mechanical strength and insensitivity to moisture may permit its use in so-called "open" coil constructions. A property that recommends it for cable designs and conductor insulation is that the film is almost ideally suited for use on high-speed taping machines.

★ ★ ★

Finally, it appears to meet electric insulation requirements in many special military applications, because of its high mechanical and dielectric strength in thin sections.

★ ★ ★

Extensive commercial production of "Mylar" probably will not be reached until sometime late in 1954 or early 1955.

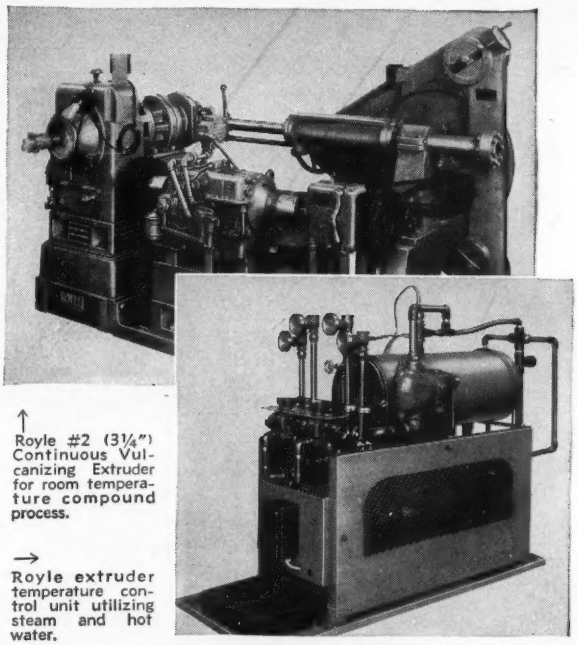
★ ★ ★

Of Particular Importance

To the Wire Insulating Industry

The room temperature compound process and associated equipment recently developed by the Western Electric Company, Incorporated, offer nine important advantages. These advantages begin with the storage of completely mixed, ready-to-extrude, rubber, GR-S, or Neoprene compounds and extend to a smoother and improved appearance for the finished product.

The complete extruder vulcanizing portion of the room temperature compound process is available to insulated wire producers* from John Royle and Sons who, for seventy-two years, have been building extruding machines to meet the most exacting process requirements.



↑ Royle #2 (3¼") Continuous Vulcanizing Extruder for room temperature compound process.

→ Royle extruder temperature control unit utilizing steam and hot water.

CHECK THESE ADVANTAGES:

- Improved diameter control
- Reduction in compound scrap
- Reduction in electrical faults
- Permits storage of completely mixed compounds
- Permits more economical scheduling of mixing equipment
- Eliminates "warm-up" operation
- Possible mill-room economies
- "Hot" machines may be converted
- Finished product has smoother finish—better appearance

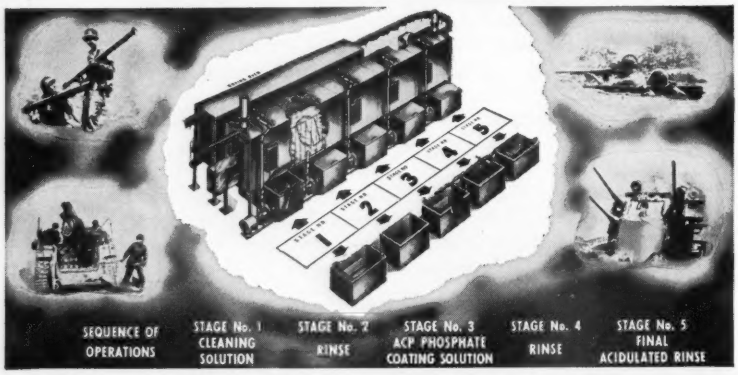
Licensees of Western Electric Company

JOHN ROYLE & SONS
10 ESSEX STREET, PATERSON 3, NEW JERSEY

AMERICAN CHEMICAL PAINT COMPANY

AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet
Subject: METAL PRESERVATION AND PAINT PROTECTION WITH ACP PHOSPHATE COATING CHEMICALS


SEQUENCE OF OPERATIONS
STAGE No. 1 CLEANING SOLUTION
STAGE No. 2 RINSE
STAGE No. 3 ACP PHOSPHATE COATING SOLUTION
STAGE No. 4 RINSE
STAGE No. 5 FINAL ACIDULATED RINSE

U.S. ARMY PHOTOGRAPHS COURTESY OF "ORDNANCE MAGAZINE"

Typical spray and dip phosphating equipment and some ordnance products that are now given a protective phosphate coating for extra durability under all kinds of severe exposure conditions. Both military and civilian applications of ACP phosphate coating chemicals are shown in the chart below.

SELECTION CHART OF ACP PROTECTIVE COATING CHEMICALS FOR STEEL, ZINC, AND ALUMINUM

METAL	ACP CHEMICAL	OBJECT OF COATING	TYPICAL METAL PRODUCTS TREATED	GOVERNMENT SPECIFICATIONS
STEEL	"GRANODINE" Zinc Phosphate Coating Chemical	Improved paint adhesion	Steel, iron, or zinc fabricated units or components, automobile bodies, refrigerators, washing machines, cabinets, etc.; projectiles, rockets, bombs, rifles, small arms, belt links, cartridge tanks, vehicular sheet metal, tank bolts and links, recoilless guns, etc.	MIL-S-5002 JAN-C-490, Grade 1 JAN-F-495 U.S.A. 57-0-2, Type II, Class C U.S.A. 51-70-1, Finish 22.02, Class C U.S.A. 50-60-1 16 E4 (Ships)
	"PERMADINE" Zinc Phosphate Coating Chemical	Rust and corrosion prevention	Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control instruments, metallic belt links, steel aircraft parts, certain steel projectiles and many other components.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class B U.S.A. 51-70-1, Finish 22.02, Class B Navy Aeronautical M-364 U.S.A. 72-53 (See An-F-20)
	"THERMOIL-GRANODINE" Manganese-iron Phosphate Coating	Wear-resistance anti-galling, safe break-in of friction or rubbing parts. Rust proofing.	Friction surfaces such as pistons, piston rings, gears, cylinder liners, camshafts, tappets, crankshafts, rocker arms, etc. Small arms, weapon components. Hardware items, etc.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class A U.S.A. 51-70-1, Finish 22.02 Class A Navy Aeronautical M-364 U.S.A. 72-53 (See AN-F-20)
	"GRANODRAW" Zinc-iron Phosphate Coating	Improved drawing, extrusion, and cold forming	Blanks and shells for cold forming, heavy stampings; tubs; tubing for forming or drawing; wire; rod; etc.	———
ALUMINUM	"ALODINE" Protective Coating	Improved paint adhesion and corrosion resistance	Aluminum products of similar design such as refrigerator parts, wall tile, signs, washing machine tubs, etc; aircraft and aircraft parts; bazookas (rocket launchers), helmets, belt buckles, clothes dryers, clothestine, rocket motors, etc., aluminum strip or sheet stock.	MIL-C-5541 (See also QPL-5541-1) MIL-S-5002 AN-F-20 U.S. Navord O.S. 675 16 E4 (Ships) AN-C-17[1] (See MIL-C-5541) U.S.A. 72-53 (See AN-F-20)
ZINC	"LITHOFORM" Zinc Phosphate Coating Chemical	Improved paint adhesion	Zinc alloy die castings; zinc or cadmium plated sheet or components; hot dip galvanized stock; galvanneal; signs; siding; roofing; galvanized truck bodies; etc.	QQ-P-416 RR-C-82 JAN-F-495 AN-F-20 U.S.N. Appendix 6 U.S.A. 72-53 (See AN-F-20)

CHEMICALS ACP PROCESSES

WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

Bridgeport Brass Progress Exhibit

An exceptionally well-presented exhibit of the **Bridegport Brass Company's** products and of products made from thin brasses and bronzes by their customers, was opened in January marking 87 years of progress. The exhibit was held at their East Main Street plant in Bridgeport, Connecticut.

★ ★ ★

Invited by the famous P. T. Barnum to move to Bridgeport in 1865, three Brooklyn manufacturers combined their resources and set up a rolling mill to make strip brass on the site now occupied by the East Main Street plant. From the original start with 100 employees, the company now operates 5 plants and has over 5,000 employees.

★ ★ ★

Bridgeport Brass enjoys the distinction of doing a number of things first: they were the first to develop a micrometer for gauging metal, they made the first bronze trolley wire, supplied the first copper wire for a long distance telephone line, were the first to extrude wire rods, made the first silicon bronze alloys and built the first all-electric brass casting shop.

★ ★ ★

The company makes a large variety of copper-base alloys and frequently will have as many as 40 different alloys moving through the rod and wire mills at one time. More recently, they began plans to produce aluminum in wire and other forms and are well along in equipping the main plant to handle this metal.

★ ★ ★

The Bridgeport Brass is to be congratulated on the interesting and informative manner in which they have set up their Progress Exhibit.

★ ★ ★

New Acropak 2½" and 3" Spool For Fine Wire Packaging

Acrometal Products Company of Minneapolis, Minn., announces a new light weight 2½" and 3" spool of drawn aluminum alloy designed especially to meet the requirements of fine wire packaging.

★ ★ ★

This spool (trade-name ACRO-PAK) was brought out only after careful research by engineers to provide features that have been

needed for a long time in the packaging of fine wire. The drawn aluminum construction assures light weight with ample strength, rigidity and durability. Tolerances within .005" on concentricity, flange run-out and traverse assure dynamic stability at high production speeds. Flanges will not toe-out under pressure.

★ ★ ★

The Company reports absolute assurance of uniform delivery over head of spool with minimum end spoilage. Because of inherent strength these spools will take repeated handling and shippings and still run true on the arbor. Maintenance cost is low.

★ ★ ★

Spools retain smooth, bright appearance without replating, polishing or buffing and can be supplied with individual end-plate colors for quick trade-identification of the wire fabricator's package.

★ ★ ★

Further information can be secured by writing Acrometal Products, Inc. 616 Fifth Street N., Minneapolis 1, Minn.

★ ★ ★

Mettler Machine Tool, Inc., Announces New Shuster Tube Straightener

Mettler Machine Tool, Inc., New Haven, Conn., announces the new Shuster Tube Straightener, of particular interest to the metal working industry.

★ ★ ★

Thin walled tubing to 1" O.D. and solid bar stock to 1/2" diameter are accurately straightened on the new Shuster Tube Straightener, a two-way geared roll machine. Power driven feed rolls advance the tube through two sets of rolls, eight rolls to a plane. **The tube does not rotate during passage,** thus eliminating stock damage such as spiralled burrs, or operator injuries due to rotating tubes.

★ ★ ★

The rolls are designed to suit particular requirements, and can be supplied for square and hexagon, as well as round stock and tubing. A motor in the base drives rolls set in Timken bearings, while idler rolls have needle bearings. Gear box is enclosed, with gears running in oil. Speed range of straightening runs up to 250′ per minute.

NARCO METAL BOUND REELS provide 300% more service. Exhaustive tests have shown a 24" all-wood reel will average four trips—*with repairs.* A NARCO METAL BOUND REEL of the same size will average 12 to 16 trips *with no repairs.* All for only approximately 50% more cost.

NARCO METAL BOUND REELS are made in 12" to 48" diameters. All-wood reels from 12" in diameter to any size required.

All reels shipped assembled or knocked down for assembly to wood or steel drums.

Further information or quotations promptly furnished.

North Anson Reel Co.

TELEPHONE MADISON 187-2 NORTH ANSON, MAINE

Outstanding Personalities of the Wire Industry

Glass Fibers Makes Changes in Executive Set-Up

At a recent meeting of the Board of Directors of **Glass Fibers Inc., Raymond W. Capaul** was elected Vice President and general sales manager. Mr. Capaul joined Glass Fibers in 1948 as electrical division manager and was promoted to general sales manager in July 1949. An engineering graduate of the University of Toledo, Mr. Capaul served twelve years with the Power Sales Division of the Toledo Edison Company before joining Glass Fibers. He is a member of the Wire Association.

★ ★ ★

At the same meeting **F. J. Solon, Jr.,** was elected Vice President—Advertising and Public Relations. Mr. Solon has been with Glass Fibers, Inc., since 1947.

★ ★ ★

Raymond F. Mensing, vice president and treasurer of the company has been assigned additional duties as general business manager, which includes supervision of purchasing and sales-production coordination activities.

★ ★ ★

R. W. Capaul, Vice Pres. & Gen'l. Sales Mgr., Glass Fibers, Inc.

Jesse H. Plummer, vice president has also been appointed general factories manager. This places Mr. Plummer in charge of all engineering activities and factory operations.

★ ★ ★

Glass Fibers Inc. manufactures glass fiber yarns and bonded mat at Waterville, Ohio, and lightweight glass wools at Defiance, Ohio.

★ ★ ★

New Sales Representative For Roebling Woven Wire Fabrics Division

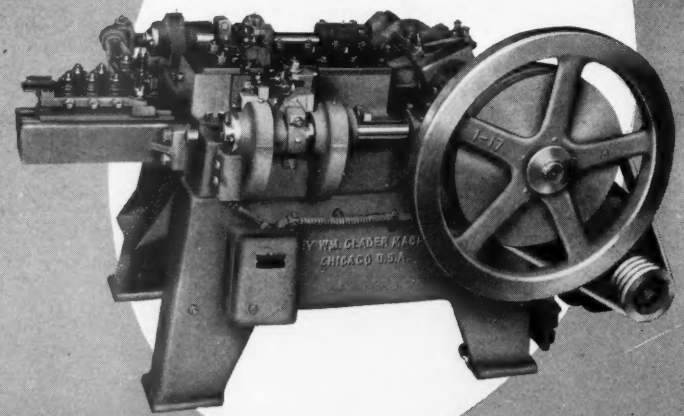
Donald C. Hansen has been named district sales representative for Ohio, Michigan and Western New York State, Woven Wire Fabrics Division, **John A. Roebling's Sons Company.** The announcement was made from the division's main plant at Roebling, New Jersey, by **Samuel K. Hornor,** manager of sales.

★ ★ ★

Mr. Hansen is a graduate of the University of Alabama. With his wife and two children, he resides in Oberlin, Ohio.

★ ★ ★

high efficiency—low cost with GLADER wire nail machines



Eliminate costly down-time in the Nail Mill by replacing obsolete machines with new GLADER NAIL MACHINES . . . For tops in efficiency and economical operation use GLADERS.

WM. GLADER MACHINE WORKS

210 N. RACINE AVENUE • CHICAGO 7, ILLINOIS

N. W. Dempsey Moved to Chicago

Nelson W. Dempsey, general superintendent of **American Steel & Wire's Cuyahoga Works**, Cleveland, has been appointed assistant manager of operations of the Chicago district.

★ ★ ★

Mr. Dempsey, 57, has been general superintendent of Cuyahoga Works since September, 1950, having left a similar post at the Wire Division's Waukegan plant.

★ ★ ★

Veteran of Sheet and Tube's Sales Staff Retires

G. B. Strausner, Pittsburgh District sales manager for **The Youngstown Sheet and Tube Company**, voluntarily retired on December 29th after 40 years of loyal service with the company.

★ ★ ★

A. A. Hare, who has been assistant district sales manager in the Pittsburgh office since April 16, 1945, succeeds Strausner as district manager, **L. E. Wallace**, general manager of sales, announced.

★ ★ ★

G.E. Chemical Division Appointments

Four appointments have been announced by **Robert L. Gibson**, general manager of the **General Electric Company's Chemical Division.**

★ ★ ★

John L. McMurphy has been appointed general manager of the Plastics Department; **Sam L. Brous** has been named general manager of the Chemical Materials Department; **James W. Raynolds** has been appointed marketing manager of the Chemical Division; and **Dr. Alphonse Pechukas** has been named engineering manager of the Chemical Division.

★ ★ ★

Nichols Appoints New Chicago Representative

Roger D. McCutcheon was appointed sales representative of **Nichols Wire & Aluminum Co.** in the Chicago area to succeed **James D. Case**, appointed products manager of the company. Mr. McCutcheon formerly represented the company in New York.

★ ★ ★

Pennsalt Appoints Macon Ordnance Specialist

J. Ralph Macon has been appointed **Pennsylvania Salt Manufacturing Co.'s** sales and service specialist in the ordnance field, it has been announced by **Joseph J. Duffy, Jr.**, Sales Manager of the Foscoat and Industrial Cleaners Department.

★ ★ ★

Mr. Macon joined Pennsalt in 1950 as an engineer in the Market Research Division, transferring to sales when the company began marketing phosphate coatings and lubricants for application to steel prior to cold working.

★ ★ ★

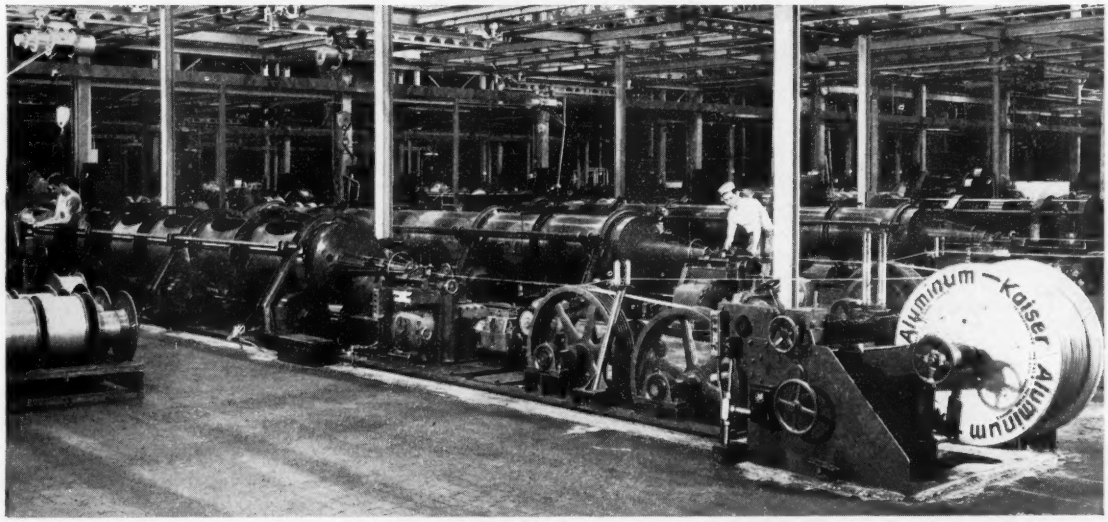
Form Alsheath Limited

British Insulated Callender's Cables, Ltd. and **The Loewy Engineering Company, Ltd.** have formed a new company to utilize their knowledge, patents and development work in the field of aluminum sheathed cables. The name of the new Company is **ALSHEATH, LTD.** and its offices are at Norfolk House, Norfolk Street, London, W.C.2.

★ ★ ★

NEW 22" SPOOL 750 RPM TUBULAR STRANDER

HYDRAULIC LIFT REEL STAND — INFINITELY VARIABLE TRAVERSE AIR CONTROLLED
DOUBLE DRUM HAUL-OFF WITH LINK BELT P.I.V. — AIR OPERATED BRAKING SYSTEM



HMT
ESTABLISHED 1846 HUGHESVILLE MACHINE & TOOL COMPANY
WIRE & PROCESS MACHINERY

Hi-Efficiency

HUGHESVILLE MACHINE & TOOL CO.
54 ACADEMY STREET
HUGHESVILLE, PA.
'Phone: 129-A

Donachie Now Heading Beryllium Corporation

Matthew J. Donachie, formerly vice president and works manager, has been made acting president of the Beryllium Corporation, Reading, Pa., to fill the unexpired term of **Otto T. Englehart,** who resigned as of March 1, 1952, but who has been granted leave of absence from January 1st. Mr. Englehart has reentered the practice of law in Washington, D. C.

★ ★ ★

The Beryllium Corporation are leading producers of beryllium copper alloys in its various forms, including wire and strip. "Scottie" Donachie, a member of the Wire Association, is a familiar figure in wire circles and has on a number of occasions prepared technical papers on the subject of beryllium copper wire metallurgy and heat treating for presentation at Wire Association meetings.

★ ★ ★

Receives Award For Excellent Management

The American Chain & Cable Co., Inc., Bridgeport, Conn., has been awarded a Certificate of Management Excellence for the year 1951 by the American Institute of Management, New York, a non-profit foundation devoted to the study and improvement of corporate organization and management. Only 298 firms in the United States and Canada were deemed eligible to receive the awards.

★ ★ ★

In deciding which companies are entitled to the designation, credits are given for excellence in ten separate fields: economic function, corporate structure, health of earnings growth, fairness to stockholders, research and development, directorate analysis, fiscal policies, production efficiency, sales vigor and executive evaluation.

★ ★ ★

Alcoa Appoints New Director of Research

Dr. Kent R. Van Horn, 46, one of the nation's leading research metallurgists and an authority on industrial X-ray, became **Aluminum Company of America's** director of research January 1st.

★ ★ ★

A veteran of 22 years with ALCOA, Dr. Van Horn will advance from the position of associate research director to succeed **Dr. Francis C. Frary,** who has retired.

★ ★ ★

In his new job, Dr. Van Horn will be heading the aluminum industry's oldest and most extensive research organization. Its headquarters are at the Aluminum Research laboratories, New Kensington, Pa. There are also three branches.

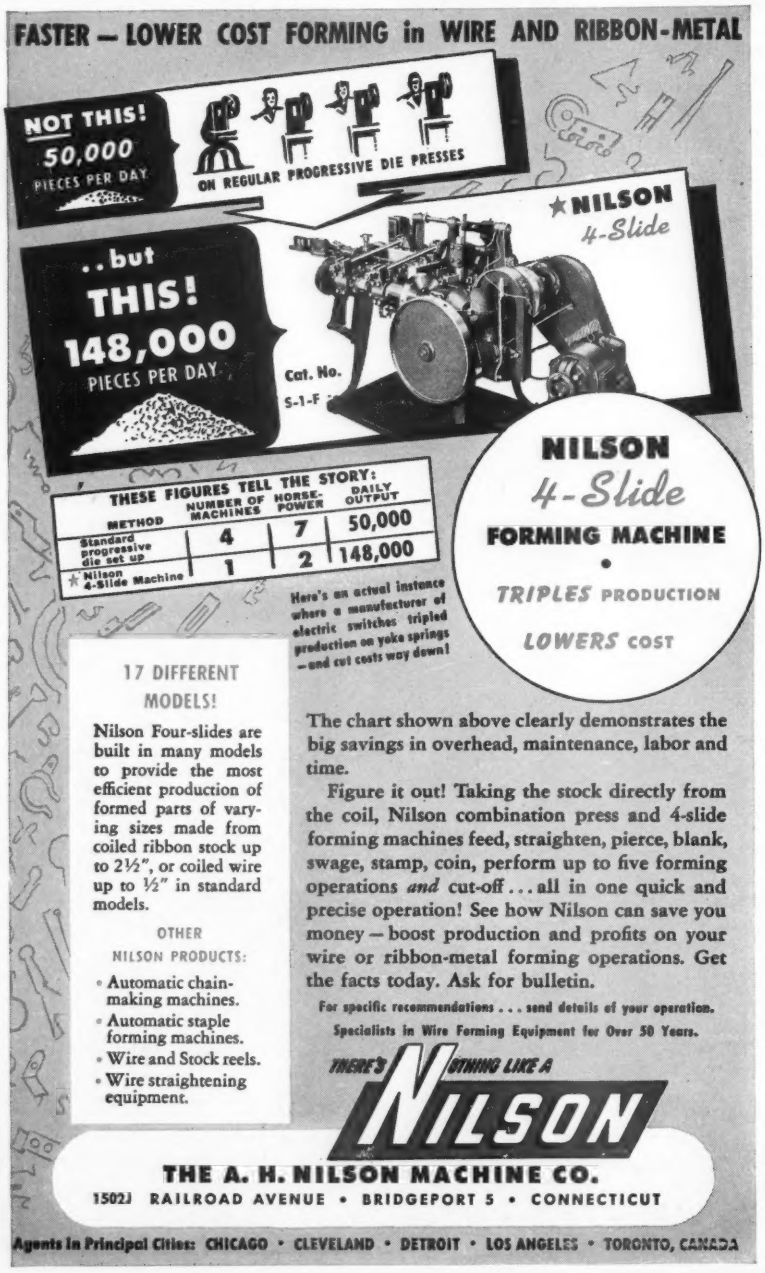
★ ★ ★

Widely known for his articles in technical publications, Dr. Van Horn is co-author of a textbook, "Practical Metallurgy," with Dr. George Sachs. Another Van Horn book, "Alloys of Iron and Aluminum," is scheduled for publication this year.

★ ★ ★

Heil Appoints Eastern Rep.

Heil Process Equipment Corporation, manufacturers of chemical-proof equipment such as tanks and tank linings, anodes, heat exchangers, etc., have recently appointed **Fred W. Arndt** as direct representative to cover the eastern states. His headquarters are at 152 West 42nd


FASTER — LOWER COST FORMING in WIRE AND RIBBON-METAL
NOT THIS!
50,000
PIECES PER DAY
ON REGULAR PROGRESSIVE DIE PRESSES
..but
THIS!
148,000
PIECES PER DAY
★NILSON
4-Slide
Cat. No.
S-1-F
THESE FIGURES TELL THE STORY:
METHOD
NUMBER OF MACHINES
HORSE-POWER
DAILY OUTPUT
Standard progressive die set up
4
7
50,000
★Nilson 4-Slide Machine
1
2
148,000
Here's an actual instance where a manufacturer of electric switches tripled production on yoke springs — and cut costs way down!
NILSON
4-Slide
FORMING MACHINE
TRIPLES PRODUCTION
LOWERS COST
17 DIFFERENT MODELS!
Nilson Four-slides are built in many models to provide the most efficient production of formed parts of varying sizes made from coiled ribbon stock up to 2½", or coiled wire up to ½" in standard models.
OTHER NILSON PRODUCTS:
• Automatic chain-making machines.
• Automatic staple forming machines.
• Wire and Stock reels.
• Wire straightening equipment.
The chart shown above clearly demonstrates the big savings in overhead, maintenance, labor and time.
Figure it out! Taking the stock directly from the coil, Nilson combination press and 4-slide forming machines feed, straighten, pierce, blank, swage, stamp, coin, perform up to five forming operations and cut-off... all in one quick and precise operation! See how Nilson can save you money — boost production and profits on your wire or ribbon-metal forming operations. Get the facts today. Ask for bulletin.
For specific recommendations . . . send details of your operation.
Specialists in Wire Forming Equipment for Over 50 Years.
THERE'S NOTHING LIKE A NILSON
THE A. H. NILSON MACHINE CO.
1502J RAILROAD AVENUE • BRIDGEPORT 5 • CONNECTICUT
Agents in Principal Cities: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • TORONTO, CANADA

Street, New York, N. Y.

★ ★ ★

Mr. Arndt has several years experience as engineer and sales engineer in the process equipment field. After a training course at the Cleveland plant, he is now in a position to give engineering assistance in connection with the many corrosion resistant products fabricated by Heil Process Equipment Corporation.

★ ★ ★

Other recent additions to the Heil staff include the appointments of **Gordon McLean** as Design Engineer and **George Gatzke** as Estimator.

★ ★ ★

Owen-Corning Advances Sales Executives

Designation of a sales manager for its General Products Division and major rearrangement of assignments of two vice presidents have been announced by **Harold Boeschenstein,** president of **Owens-Corning Fiberglas Corporation.**

★ ★ ★

Ben S. Wright, vice president since 1949 and general sales manager since 1947, was reassigned as vice president in charge of purchasing and trade relations.

★ ★ ★

E. W. Smith, who was appointed vice president and director of merchandising last May, was reassigned as vice president in charge of sales branches and training programs.

★ ★ ★

Edward J. Detgen was named sales manager of the General Products Division. All will make their headquarters in the Owens-Corning general offices in the Nicholas Building, Toledo.

★ ★ ★

Mr. Wright's new duties embrace purchasing and trade relationships with national accounts and procurement of materials for Fiberglas manufacturing operations in plants located in Anderson, South Carolina, Ashton, Rhode Island, Huntingdon, Pennsylvania, Kansas City, Kansas, Newark, Ohio, and Santa Clara, California. He became associated with Owens-Corning in 1940 and in 1945 became manager of the Fiberglas branch sales office in Cleveland. He returned to the firm's general offices in Toledo in 1947 and was elected vice president of the company in 1949.

★ ★ ★

Mr. Smith joined Owens-Corning in 1949 and has been in charge of merchandising and advertising programs, and sales recruiting and training activities in the company's general sales department.

★ ★ ★

Naugatuck Chemical Appointments

Two major organizational changes in the **Naugatuck Chemical Division, United States Rubber Company,** have been announced by **J. P. Coe,** vice president and general manager.

★ ★ ★

Clayton F. Ruebensaal, formerly technical director, plastics and resins, for the division, was named commercial development manager.

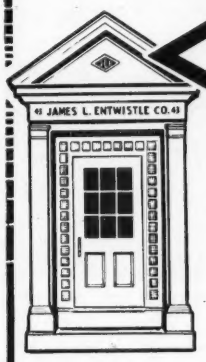
★ ★ ★

Dr. D. Lorin Schone, formerly manager of organic research, was named to succeed Mr. Ruebensaal as manager of plastics development.

★ ★ ★

In his new position, Mr. Ruebensaal will concentrate on developing new commercial outlets for the products of Naugatuck's fundamental research. His work will include the economic evaluation of raw material supplies, plant sites, potential markets, potential competition and investment requirements.

★ ★ ★



JLE

SERVING THE WIRE INDUSTRY THROUGHOUT THE WORLD

- Standard Sets of Spark-Testing Equipment
- Take-ups and Re-spoolers
- Reelers
- Coilers
- Spoolers
- Collapsible Coiling Reels
- Wire Sparkers and Accessories
- Hand Locators
- Electrode Units and Stands
- Measuring Machines, Counters and Accessories
- Wire Guide Units
- Pay-off Reels Stands
- Electronic Devices
- Conduit Connection Sets
- Wire Pre-Heater
- Disk Brakes and Controls, Drag Units and Slip Clutches
- Wire Marking Machines, Type Strips, Inks
- Labelling Machines
- Pneumatic Equipment and Controls
- Miscellaneous Equipment
- Hydraulic Equipment and Controls
- Hi-Pot Test Sets
- Cable Handling Equipment for Warehouse Use

See page 148 for news of the JLE Pay-Off Reel Stand, Class T

JAMES L. ENTWISTLE CO.

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European & South American Agents: M. CASTELLVI, INC. 130 BROADWAY, NEW YORK 7, NEW YORK

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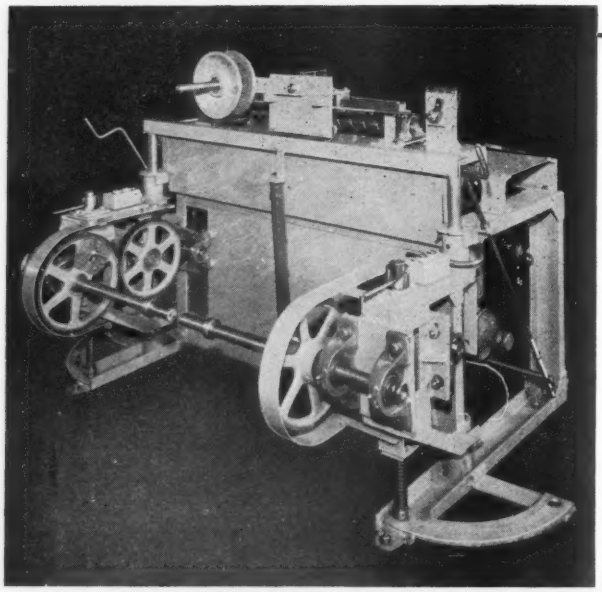

Another First by Federal —
A Low-Priced

DOUBLE TAKE-UP

with Variable Speed Traverse

Has wide range of speeds—up to 1200 F.P.M. Heavy steel frame and precision construction assures smooth operation and long dependable service. Will handle up to 30" reels.

FEDERAL EQUIPMENT is neither inflated in price nor deflated in quality. They're efficient and good.

PROMPT DELIVERIES

Write today for details and prices.

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RESPOOLERS
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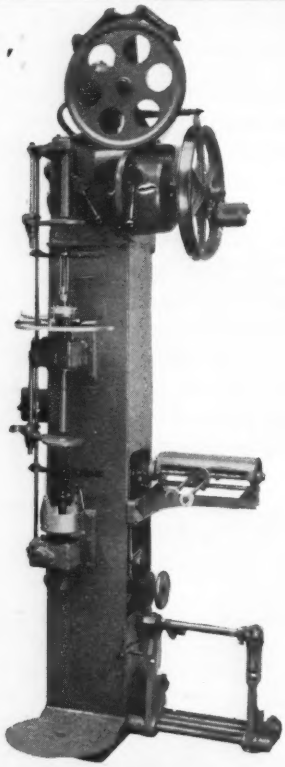
Federal Manufacturing Co.

SPECIAL WIRE MACHINERY

236-240 Hall Avenue, Wallingford, Conn.



INSULATING MACHINE IM 402

THE BEST MACHINERY FOR WIRES AND CABLES

HERE ARE OUR PRODUCTS:

- **Vertical and Horizontal Insulating Winding Machines**
  Covering wires from 38 AWG size to a 4" diam. cable, with cotton, silk, nylon, fiberglas, paper or asbestos—for magnet wire, telephone cable, power cable, flexible cable.
- **Bunching Machines for Fine Wire**
- **Assembling Machine for up to 18 Covered Wires**
- **Hi-Speed Winding Machines**
- **Quadding and Twisting Machines**
- **Horizontal Twinners**
- **Rubber Covering Machines**
- **Cable Handling Equipment**
- **Re-Spoolers**
- **Haul-Off Capstans with Variable Drive**

POURTIER MACHINES

153, RUE GALLIENI, ROMAINVILLE (SEINE), FRANCE

James R. Thompson Joins Lamson and Sessions Co.

James R. Thompson, whose retirement as manager of the Metallurgical Department of the **American Steel and Wire Company** was announced last month, has joined the **Lamson and Sessions Company** in Cleveland, where he will be concerned with the metallurgical problems.

★ ★ ★

His first job will be to survey the raw material requirements of all the Lamson plants and make recommendations for improvements in raw materials and plant processes concerned with the manufacture of fasteners.

★ ★ ★

Mr. Thompson had been with the American Steel & Wire Company for 50 years and was retired on reaching the age at which by ironclad company rule, employees are required to relinquish whatever posts they may have occupied. He is considered an authority on wire, rod and all cold heading materials and processes.

★ ★ ★

During his long years of association with the steel industry, he has served with many important advisory groups and has been chairman of the Wire and Rod Committee of the American Iron and Steel Institute for a number of years. For the past several years Mr. Thompson has been a director of the Wire Association, in which post he continues.

★ ★ ★

Lamson and Sessions are to be congratulated on having secured so able an authority on cold heading products, and, Jim, in turn, is most fortunate in having become affiliated with so splendid and progressive a member of our industry.

★ ★ ★

Canada Wire & Cable Elects Two Vice Presidents

J. Y. Murdoch, president of **Canada Wire & Cable Company, Ltd.,** Leaside, has announced the appointments of **O. W. Titus** and **L. G. Lumbers** as vice presidents of the company.

★ ★ ★

Mr. Titus continues as general manager of the operations of the company which include factories at Leaside, Ontario; Montreal East, Quebec; and Vancouver, B. C., as well as sales offices from coast to coast.

★ ★ ★

Mr. Lumbers as vice president will coordinate the sales, product control and engineering phases of the company's operations.

★ ★ ★

Three Changes in Sales Department Announced by AS&W

Promotions of three men to fill important posts in the Chicago district sales offices of the **American Steel & Wire Company** were announced recently by **John Graham,** general manager of sales.

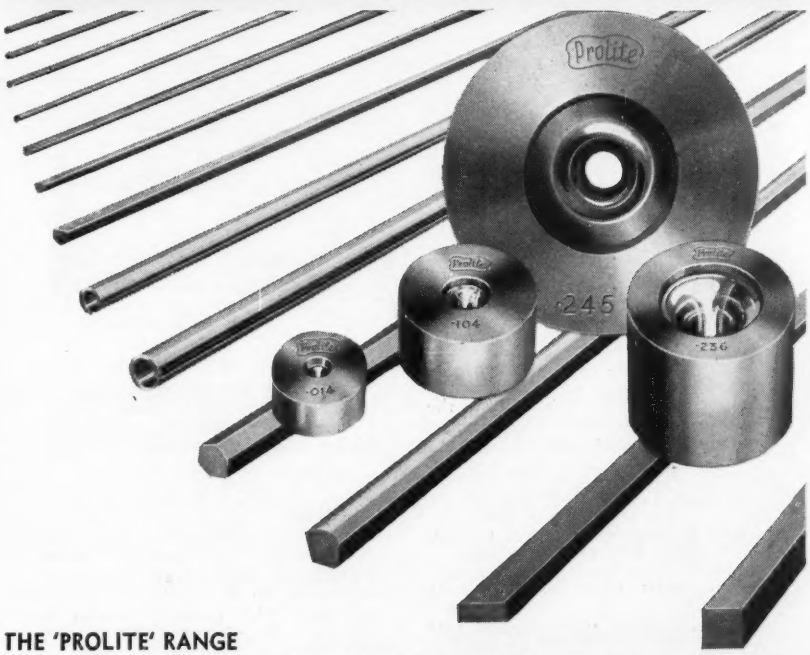
★ ★ ★

Fred L. Nonnenmacher has been named manager of Chicago district sales succeeding **E. A. Murray,** resigned. Taking Mr. Nonnenmacher's place as manager of the manufacturers products sales department in Chicago is **S. W. Goodenough,** while **R. H. Hauger** succeeds Mr. Goodenough as assistant manager of manufacturers' products sales.

★ ★ ★

Leading British Manufacturers use Prolite DRAWING DIES

CEMENTED TUNGSTEN CARBIDE



THE 'PROLITE' RANGE OF MUREX METALLURGICAL PRODUCTS INCLUDES:

Tungsten Carbide Tips and Tipped Tools, Bar, Tube and Wire Drawing, Extruding and Metal Forming Dies and Die Pellets, Cold Heading Dies, Nozzles, Guides, Bushes and other Wear Resisting Parts.

MUREX LTD. (Powder Metallurgy Division) RAINHAM • ESSEX • ENGLAND

London Sales Office: Central House, Upper Woburn Place, London, W. C. I.

Jeff Crum First to Call at Our New Offices

Although we were scheduled to move to our new offices just before the turn of the year, the quarters being ready, we made the shift on Saturday, December 15th.

★ ★ ★

On Monday, December 17th, **E. Jefferson Crum,** STEELSKIN Ambassador Extraordinary (R. H. Miller Company, Homer, N. Y.) was the first member of the Wire Association to honor us by paying a visit at our new headquarters at 453 Main Street, Stamford, Conn.

★ ★ ★

Jeff, as most will recall, achieved considerable fame as the inventor of the Crum Calculator for Wire Drafting, a useful, time-saving device for wire drawing men.

★ ★ ★

We were delighted to see Jeff and hope that other members will follow his example in calling upon us whenever in our neighborhood.

★ ★ ★

Gretter Advanced by National Electric Products

Joseph J. Gretter, Jr., has been named assistant service manager of **National Electric Products Corp.,** Pittsburgh.

★ ★ ★

In announcing this promotion, **R. C. Bennett, Jr.,** vice president and general sales manager said Mr. Gretter would assist **J. L. Bauer,** service manager, in expediting orders for the company's electrical roughing-in materials through the manufacturing plant at Ambridge, Pa.

★ ★ ★

Mr. Gretter, a company employe since 1949, studied at Duquesne University. His headquarters are in the company's general offices in the Chamber of Commerce Bldg., Pittsburgh.

★ ★ ★

A. S. & W. District Office Changes

Appointments affecting sales officials in New York and Philadelphia district sales offices of **American Steel & Wire Division of U. S. Steel Company** have been anounced as follows:

★ ★ ★

Named as manager, New York district sales office, was **W. W. Deal,** who for 21 years has held a similar post in the division's Philadelphia district sales office. He fills the vacancy created by the death of **W. E. Mackley.**

★ ★ ★

L. L. Anderson, assistant manager of sales at Philadelphia since 1937, was elevated to manager of sales there. **R. W. Drake,** manager of sales at Wilkes-Barre since 1947, was transferred to Philadelphia as assistant manager of sales.

★ ★ ★

Mailman Heads Chatillon

Norton W. Mailman has been elected president, **John Chatillon & Sons, Inc.,** New York, producer of scales, carriers, cutlery, precision springs **Alfred J. Chatillon,** the former president, was elected chairman of the board. Prior to his present association, Mr. Mailman owned and operated Fischer Spring Co., was assistant to the president of Pal Razor Blade Corp., and personnel director of Radio Division, Bendix Aviation Corp. He is currently president of Ardril Realty Corp. and a director and owner of Burrough Bros. Mfg. Co. Inc.

★ ★ ★

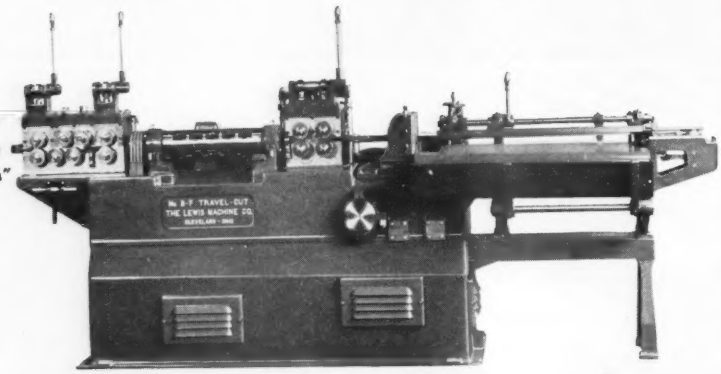
Fast, Accurate, Economical

STRAIGHTENING and CUTTING

with LEWIS **TRAVEL-CUT**

MACHINES

22 Models to handle from 1/16" to ¾" Round, Hex, Flat, Shapes.



Simple in design, rigid in construction, Lewis TRAVEL CUT will deliver continuous dependable service under the most severe, high production conditions—day in, day out. Feeds wire from the coil, straightens accurately, gauges to uniform length, and cuts clean without stopping the wire. For steel, brass, aluminum and alloy wire. Cut your cutting costs with the Lewis TRAVEL CUT. Full details on request.

Exclusive Representatives

EAST: Penn Machinery Co., 117 North Third Street, Philadelphia 6, Penn.

MIDDLE WEST: Steel & Wire Machinery Co., 15457 Euclid Ave., Cleveland 12, O.

CENTRAL: Moslo Machinery Co., 2443 Prospect Avenue, Cleveland 15, Ohio.

WEST COAST: Hoffman & Heartt, 3005 So. Grand Ave., Los Angeles 7, California

CANADIAN: Empire Engineering Co., 11 Wellington St. E., Toronto 1, Ontario.

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The LEWIS MACHINE Company

3441 E. 76th Street, Cleveland 27, Ohio

Also agents in Paris, Stockholm, Rotterdam, Brussels, Zurich, Milan. Bombay and Melbourne

A Review of Recent Wire Patents

No. 2,577,059, ROT-RESISTANT INSULATED CABLE, patented December 4, 1951 by Herbert C. Witthoft, Marion, Ind., assignor to Anaconda Wire and Cable Company, a corporation of Delaware.

The wire conductors are rubber-sheathed and a rubber spacer of special configuration disposed between them, with a thin paper wrapping about the insulated wire conductors and spacer and a rubber jacket about the paper sheath. It is stated that the paper wrapping is tightly adherent over its entire area to the inner surface of the jacket but being non-adherent to the underlying layers of insulation and spacer; the spacer and the insulation of the conductors being individually vulcanized and hence non-adherent to each other or to the paper wrapping with which they are in contact.

* * *

No. 2,577,132, WIRE COATING APPARATUS, patented December 4, 1951 by Ray C. Kivley, Kenmore, N. Y., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

A coating applicator and roller is provided which is adapted to be submerged into the bath of coating fluid when the former is not in use so that will not harden upon the applicator and roller.

* * *

No. 2,577,373, GARDEN TRELLIS, patented December 4, 1951 by Norvin E. Smith, Altadena, Calif.

An adjustable-height collapsible garden trellis for supporting plants which increase substantially in height and in weight of foliage and fruit as they mature comprising a single length of wire formed into a double conical unit.

* * *

No. 2,577,473, WIRE GARMENT HANGER, patented December 4, 1951 by Norman S. McEwen, Fort Lauderdale, Fla.

The hanger, which is adapted to be hung on a wall surface, is constructed of a single length of wire bent to shape.

* * *

No. 2,577,812, UPHOLSTERY SPRING CONSTRUCTION, patented December 11, 1951 by Emanuel Samel, Denville, N. J.

One end coil of the wire helical spring is provided with a number of irregularly shaped portions, each of the portions comprising at least one separate part rigidly secured to the wire of the end coil and equiangularly disposed about this end coil, each of the irregularly shaped portions being adapted to have a flexible cord knotted thereto by a knot formed from a bight portion of the cord, so that the cord will be prevented from movement with respect to this end coil by the rigid connection between this irregularly shaped portion and the end coil of the spring.

* * *

No. 2,577,813, CORD ATTACHMENT MEANS FOR UPHOLSTERY SPRING, patented December 11, 1951 by Emanuel Samel, Denville, N. J.

There are 10 claims in this patent to a bent wire end portion of a helical wire spring.

* * *

No. 2,577,843, METHOD OF MANUFACTURING WIRE CORD, patented December 11, 1951 by Melvin A. Crosby and Enrique L. Luaces, Dayton, Ohio, assignors to The Dayton Rubber Company, a corporation of Ohio.

The method comprises applying a thin coating of rubber composition on a surface; placing thereover a number of fine wires lying parallel to and spaced from each other; depositing thereover a second thin layer of rubber composition; and rolling the resulting laminated body around the longitudinal axis of the wires in a number of involute layers to form a cord.

* * *

No. 2,578,216, WIRE-FORMING MACHINE, patented December 11, 1951 by Harry M. Young, Webster Groves, Mo., assignor to Western Wire Products Company, St. Louis, Mo., a corporation of Missouri.

This machine is adapted to form pipe hangers and the like from wire.

* * *

No. 2,578,217, SCREW AND WASHER

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 453 Main St., Stamford, Conn.

anneal wire the MODERN way!

You'll save money, you'll improve efficiency along many lines with the unique Ajax Electric Salt Bath wire annealing method. It requires less floor space, less labor, less maintenance. Heating cycles average less than 20 minutes, even on difficult jobs. There is no scaling, no decarburization, no explosion hazard, none of the bothersome problems entailed with atmosphere equipment. Salt bath treating does the work faster, better, cheaper!

Ideal for annealing low- or high-carbon and stainless steel wire and rod; annealing aluminum, and copper and silver alloys; and for descaling stainless and alloy steel wire in molten salt baths.

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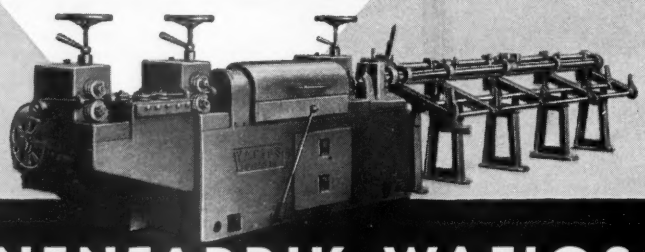
WIRE-WORKING MACHINERY

Wire Netting Machines for Chain Link, Hexagonal Mesh, Poultry Netting, Field Fence. Crimping, Barb Wire and Staple Machines. Spring Coilers. Spring End Grinding Automatics. Loop Benders. Upholstery Spring and Wire Mattress Machines. Wire Nail Machinery. Chain Formers. Chain Welders. Straightening and Cutting Machines. Multi-Slide Wire and Strip Forming Machines. Special Machinery for the making of Paper Clips, Lock Washers, Bale Ties, Key Rings, Tin Openers, Wire Bag Ties, etc. Automatics for Flexible Metallic Tubing.

Sole Agents for Australia and New Zealand:
Bliss & Reels Co. Pty. Ltd., 64-66 Little Bourke Street, Melbourne C. 1, Australia.

WAFIOS

SINCE 1893



MASCHINENFABRIK WAFIOS

WAGNER, FICKER & SCHMID **REUTLINGEN 3 / WÜRTT. GERMANY**

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MASCHINENFABRIK

KÖLN-RADERBERG

A new

Universal Multi-Slide Bending Machine

for the full-automatical and economical manufacture of mass-produced articles of all kinds from wire and strip.

Special features:

- Vertical structure, covered construction, smallest space requirements.
- Bending slides positively moved and directly steered, therefore high output and fool-proof operation.
- Exact wire feed by a special steered pressing device.
- Simple shaped tools, easy to supervise, to adjust, and to exchange.
- Possibility to use further slides for unusual bending shapes.
- Additional equipment for stamping, punching, and piercing.

Please enquire for our detailed catalogue-sheet which will inform you about working ranges and employments of our Multi-Slide Bending Automatics.

ASSEMBLY MACHINE, patented December 11, 1951 by William C. Anderson, Oak Park, Ill., assignor to Illinois Tool Works, Chicago, Ill., a corporation of Illinois.

There are 19 claims to the machine which includes a non-rotatable washer hopper, a spear mounted for longitudinal movement upwardly through a disorderly mass of washers in this hopper, a device on the spear to impale a washer thereon during the upward movement of the spear through the disorderly mass, means above and in the path of the spear as it moves upwardly for extracting a washer from the spear, and means for feeding an extracted washer and a screw relatively into telescoping engagement.

★ ★ ★

No. 2,578,260, APPARATUS FOR LUBRICATING WIRE ROPES OR CABLES, patented December 11, 1951 by Alexander McPherson and William Barton Bird, Glasgow, Scotland.

Automatic lubrication of the rope is effected by the two devices disclosed in this patent.

★ ★ ★

No. 2,579,117, APPARATUS FOR MAKING SECTIONAL WIRES, patented December 18, 1951 by Merle W. Kremer, Euclid, Ohio, assignor to General Electric Company, a corporation of New York.

More specifically, this is a welding apparatus for making sectional wires.

★ ★ ★

No. 2,579,392, DISPOSABLE CART FORMED FROM WIRE, patented December 18, 1951 by Willard H. Nordenson and Warren W. McCaw, Dubuque, Iowa, assignors, to Deere Manufacturing Co. Dubuque, Iowa, a corporation of Iowa.

Except for the wheels, this device is constructed wholly of bent wire.

★ ★ ★

No. 2,579,818, SPRING ASSEMBLY, patented December 25, 1951 by Jacob Goldstein, Mishawaka, Ind.

In this assembly the stress transmitted by short intermediate frame elements of the assembly, incident to compression of the springs connected to the selected side of the marginal frame, being small compared to the stress transmitted by intermediate frame members incident to compression of any of the other springs of the spring unit.

★ ★ ★

No. 2,579,970, COIL SPRING RETAINING ROD, patented December 25, 1951 by August G. Scampone, Utica, N. Y.

More specifically a wire tie device is provided for connecting wires of coil springs disposed in a row.

★ ★ ★

No. 2,580,055, WIRE NAIL MACHINE, patented December 25, 1951 by Jean Louis Weber, Puteaux, France.

The improvements relate to a cutting device for nail machines.

★ ★ ★

No. 2,580,087, SAFETY PIN, patented December 25, 1951 by Charles Garber, Providence, R. I.

This safety pin is constructed mostly of a single length of wire.

New Bulletin on Carboloy Dies

A new bulletin, "How to get the Bonus Tonnage from Every Carboloy Wire Die", has been published by the **Carboloy Dept. of General Electric Company,** 11115 E. 8 Mile Rd., Detroit 32, Mich.

★ ★ ★

It describes the factors in Carboloy dies that make for "bonus tonnage" and lists the various services offered that help to make users get the most out of their dies.

★ ★ ★

Copies are available upon request.

★ ★ ★

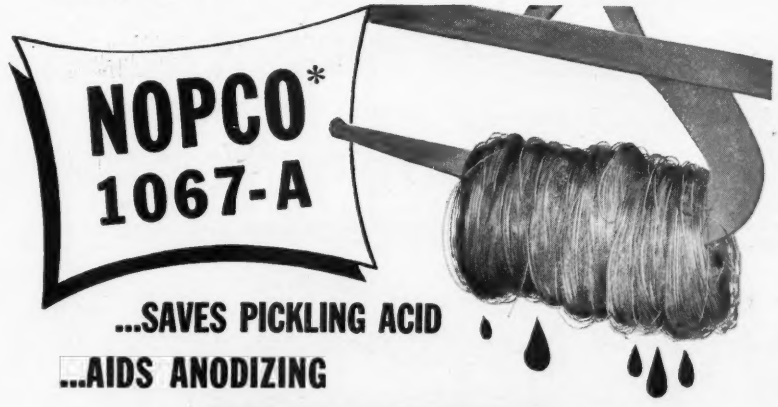
Sharples Chemicals Combines With Pennsalt

The combination of **Sharples Chemicals, Inc.** with the **Pennsylvania Salt Manufacturing Co.** through an exchange of common stock has been effected according to **George B. Beitzel,** Pennsalt president.

★ ★ ★

Sharples will continue to operate as a separate unit with, however, an exchange of technical information and coordination of some policies to the mutual benefit of both organizations.

★ ★ ★



...SAVES PICKLING ACID
...AIDS ANODIZING
...IMPROVES PHOSPHATIZING

In all of these important operations—pickling, anodizing, phosphatizing—the remarkable ability of Nopco 1067-A to reduce surface tension in mineral acid solutions leads to definite economies, improvements in processing, and better final products.

PICKLING—Addition of Nopco 1067-A to the pickling bath—

(a) reduces loss of acid solution through carry-over to the rinsing tank by 30% to 40%;

(b) reduces acid contamination in operations following pickling—helping to increase die life;

(c) effects faster and more uniform penetration of oxide scale—assuring clean, *smooth* metal surfaces after pickling.

In general, 0.1% of Nopco 1067-A on the weight of the acid solution gives outstanding results.

ANODIZING—Use of Nopco 1067-A in the anodizing bath not only affords high drain-off of the acid solution, but results in "taming" of the bubbles caused by air-blast agitation. Bubbles are reduced in size and they burst gently, minimizing spray. In some instances, need for costly lead-lined exhaust fans has been eliminated.

PHOSPHATIZING—Addition of 0.1% of Nopco 1067-A to "Bonderizing" chemicals lowers surface tension substantially. This results in exceptionally even spreading which promotes excellent over-all adherence of paint or enamel to ferrous metal.

Mail the attached coupon today. We'll send you promptly full information about Nopco 1067-A —the unique wetting agent which not only assures improved products but saves money, time, and labor in all types of acid treatments.

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Please send me full information about Nopco 1067-A

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The combination with Sharples gives Pennsalt an established position in the synthetic organic chemical field—a field in which the latter have been increasing its activities for several years.

★ ★ ★

Another advantage to the combination is that it assures Sharples of a supply of some of its basic raw materials, chlorine, caustic soda and ammonia, which are produced at Pennsalt's Wyandotte plant, adjacent to the Sharples plant.

★ ★ ★

The Engineer's Illustrated Thesaurus

The Engineer's Illustrated Thesaurus, by **Herbert Herkimer,** has just been published by **The Chemical Publishing Co., Inc.,** 212 Fifth Ave., New York 10, N. Y.

★ ★ ★

Over 8,000 illustrations of machine elements and assembled machinery for the engineer, designer, draftsman and manufacturer to select the machine parts or equipment most suitable for his special purpose. It will also serve as an efficient guide for students and beginners.

★ ★ ★

Every conceivable type of machine element is clearly reproduced and identified. Where necessary an explanation of the method by which it accomplishes its particular function is given. For additional convenience there is an exhaustive index to save much page-thumbing.

★ ★ ★

The simple and logical system of the book will enable the engineer to find the information needed in the shortest possible time. Fasteners; adjusting devices; supports and structures; basic mechanical movements; elevators, cranes, derricks, conveyors; transmission of liquids and gases; combustion; prime movers; transportation; industrial processes; electrical appliances; comfort heating, cooling and air conditioning are the main classes treated in the book.

★ ★ ★

It contains 572 pages and sells for $6.00 a copy.

★ ★ ★

Uses for Aluminum Powders & Pastes Detailed in New Book

"Aluminum Powders & Pastes" is a new 84-page manual just published by **Reynolds Metals Company,** 2500 South Third Street, Louisville, Kentucky. It covers not only the more familiar uses of powdered aluminum in aluminum paints, irridescent auto finishes, roof coatings and the like, but also describes such unique applications as chemical reactions which provide heat without flames, sea markers that help locate downed airmen, bombs whose destructive power is doubled by powdered aluminum, powder metallurgy, surgery, silicosis treatment and other amazing developments.

★ ★ ★

Many important applications of aluminum powders have barely been touched upon so far and there are new ones still in the "dream" stage. With aluminum powders thus becoming of increasing importance, there is need for a compact source of information on the various powders, their characteristics, methods of control and testing, along with

FOR
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SELECT HARPER PRODUCTION FURNACES
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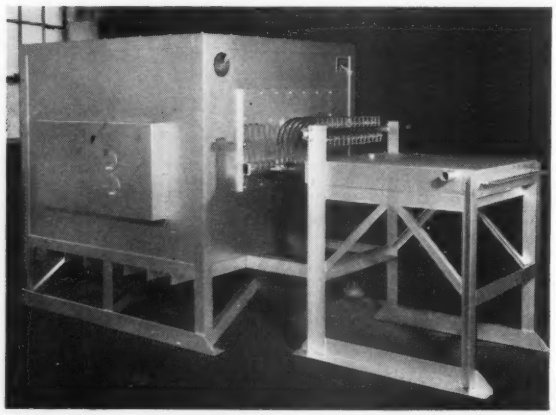
your HEAT TREATING OPERATIONS



Harper 30 strand Electric Wire Annealing Furnace, designed for bright annealing stainless steel wire in a hydrogen atmosphere. Temperature range is 2000°F-2200°F. Uniform results easily obtained by maintaining extreme temperature uniformity during slow anneal in accurately controlled atmosphere. Sizes to meet production requirements for wire and strip annealing.

TYPES

Mesh Belt — Pusher Type
Bell — Elevator
Pit — Car Bottom
Box — Forging
Wire and Strip

PROCESSES

Continuous Brazing — Sintering
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High Speed Steel Heat Treating
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WRITE FOR BULLETIN 1051

Harper

HARPER ELECTRIC FURNACE CORPORATION
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recommendations for their use. All these are within the scope of the new book.

★ ★ ★

Metal powders are as old as metals themselves. The book starts out by tracing the production and use of aluminum powders from antiquity down to the present day and outlining the three modern production methods employed in Reynolds Louisville plant, the largest of its type in the world.

★ ★ ★

The various applications are covered in separate chapters devoted to paints and coatings, pyrotechnics, heat reactions, chemical processing, powder metallurgy, surgery and silicosis. Also, decorative "flitter", plastics, sealing wax, candles, water markers, mold washes, cements, caulking and sealing compounds, heat-reflective fabrics, water-proof fabrics, synthetic yarn are detailed in the manual.

★ ★ ★

Other chapters discuss physical properties, chemical properties, testing and evaluation methods, recommended handling and storing procedures.

★ ★ ★

This book will be supplied without charge to engineers, technical men and executives who request it on their business letterhead. Address Reynolds Metals Company, 2500 South Third Street, Louisville 1, Kentucky.

★ ★ ★

Standard Cable Completes Conversion

Conversion of all production facilities at two plants to war material was completed by **The Standard Cable Corporation** of Chickasha, Oklahoma during the third quarter of this year, it was announced by **William D. Claypool**, President of the Corporation.

★ ★ ★

The chief product of the Chickasha plants is vitally needed combat telephone wire for the Armed Services and it was to meet heavy Armed Service demands that Standard Cable undertook the huge expansion program completed in 1951. The program established Standard Cable as the only inland wire and cable company of vital importance to the War Department and the largest single wire and cable manufacturing unit in the nation.

★ ★ ★

To meet increased requirements for commercial consumers, Standard Cable has leased a third plant to provide manufacturing space. To date, a substantial order backlog exists and operations were expected to be stepped up in January.

★ ★ ★

New Bulletin Describes G.E.'s Insulating Materials

The various types of electric insulating materials produced by the **General Electric Company's Chemical Division** are described in a new bulletin, CDL-35, recently published by the Division.

★ ★ ★

Properties and applications of G-E varnishes, Glyptal alkyl resin insulating finishes, varnished cloths and tapes, sealing and filling compounds, and G-E silicone insulating materials are described, with accompanying photographs.

★ ★ ★

Copies of this bulletin may be obtained by writing to the Chemical Division, General Electric Company, Pittsfield, Mass.

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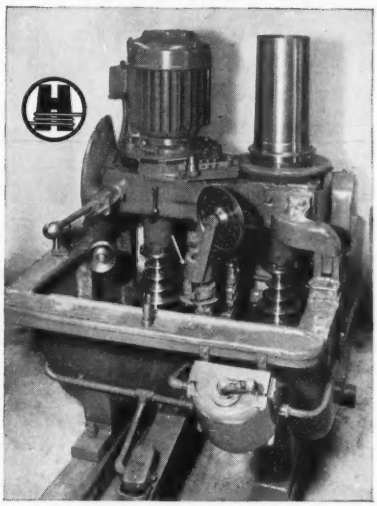
WIRE DRAWING MACHINERY



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for the drawing of iron wires, starting size .0591", finishing .0236" or less, and of steel wires from .0473" to .0197" or less; for phosphor bronze and other hard wires from .0473". 10 hp. motor with change-speed gearbox.

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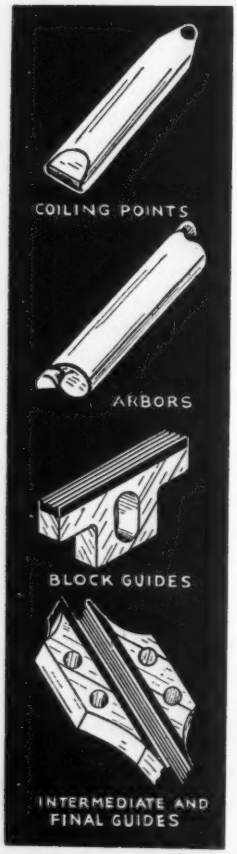

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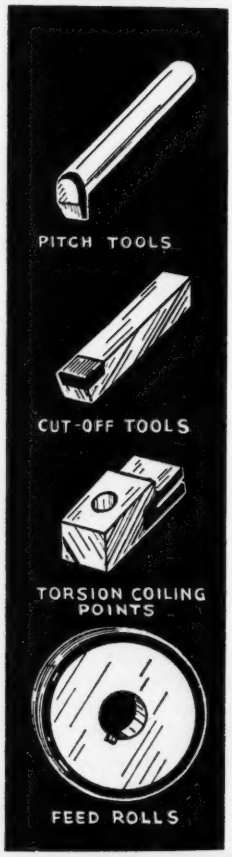


Decorated Metal Manufacturing Company Moves to Jersey

Decorated Metal Mfg. Co., Inc., which has been in operation in Brooklyn since 1907 has transferred its plant and office to Milltown, New Jersey, it was announced by **George D. Atwood,** president.

★ ★ ★

The company manufactures metal bobbins for the nylon, silk, and rayon industries; spools and containers for adhesive and industrial tapes, solder wire, asbestos, and so forth.

★ ★ ★

The new facilities provide substantially increased manufacturing capacity. The plant, a three-story brick building containing 80,000 square feet of space, is located on an 8½-acre plot. A railroad siding and adequate truck handling facilities are also available.

★ ★ ★

Established 45 years ago for the manufacture of steel spools and packaging cans for typewriter ribbons, the company soon expanded from production of simple and standardized products to the manufacture of well-engineered, precision-made items for many industries.

★ ★ ★

New Folder Describes Advantages of Aluminum Spools for Wire Packaging

Big industry is fast discovering the advantages of the drawn aluminum alloy spool for precision wire packaging, and a recent folder describing the reasons for this trend has just been published for distribution.

★ ★ ★

The folder has been prepared by **Acrometal Products, Inc.,** 616 North Fifth Street, Minneapolis, manufacturers of the trade-tested ACROPAK drawn aluminum alloy spool. This spool comes in all standard sizes for precision packaging of copper, steel and aluminum wire.

★ ★ ★

Discussed also in the folder is the important effect of these spools in reducing operating costs both as to shipping and drawing, plus the further advantage of low maintenance cost. The folder gives valuable engineering details on ACROPAK spools and points out that the drawn aluminum alloy construction offers light weight with great strength and dynamic balance. This in turn is translated into lower freight costs, longer life and trouble-free production.

★ ★ ★

Folder is available to all wire manufacturers by addressing Acrometal Products, Inc., 616 North Fifth St., Minneapolis 1, Minn.

★ ★ ★

New Edition of Industrial Diamond Trade Name Index

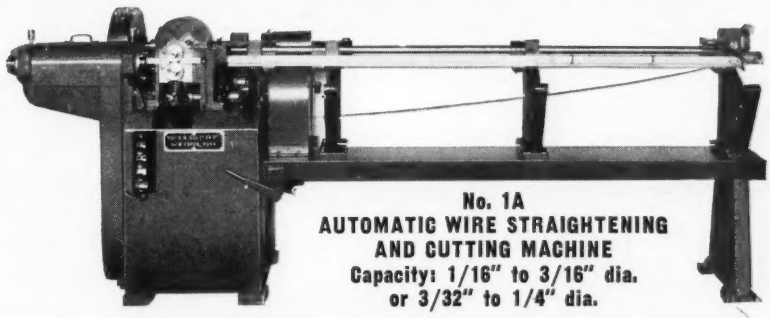
The 1951-52 edition of the **Industrial Diamond Trade Name Index** has been published jointly by the Industrial Diamond Information Bureau and Industrial Diamond Review, St. Andrew's House, 32/34 Holborn Viaduct, London E.C. 1, England. The Index will be found of particular interest to users of diamond tools, hard abrasives, sintered carbides and materials used by engineers in precision work.

★ ★ ★

The Index contains approximately 1500 trade names of diamond tool, abrasives, etc. manufacturers. The price is 3/6 d.

★ ★ ★

A "SHUSTER" *automatically* boosts production in wire-using plants!



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AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE
Capacity: 1/16" to 3/16" dia. or 3/32" to 1/4" dia.

Wherever a Shuster is installed, production increases as high as 75 percent have been recorded. Shusters take wire from coil stock, then straighten and cut it to accurate lengths, all in a smooth, precision operation noted for the almost continuous wire travel. Once set, Shusters require little attention beyond keeping them supplied with coils.

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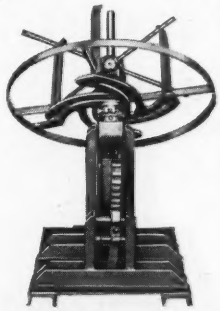

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The counterbalancing weight does practically all the lifting, permitting one man to raise the heaviest coils of wire to the operating position.

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SHUSTER *Automatic* — Since 1866 — WIRE STRAIGHTENING AND CUTTING MACHINES

Beryllium Copper Wire: Its Processing and Uses

(*Continued from page* 154)

wear and wire breakage may result.

★ ★ ★

To insure effective cleaning, it is essential that oil, grease and other lubricants be completely removed prior to pickling. Either vaporized solvents such as trichlorethylene or alkaline cleaning solutions are satisfactory for the removal of oil, grease and dirt. There are available several proprietary electrolytic cleaning methods which give good results in removing dirt and scale.

★ ☆ ☆

For pickling, a 20 to 30% by volume solution of sulfuric acid (concentrated, 1.83 specific gravity) and water should be used at 160 to 180 F. with immersion time sufficient to completely loosen scale. Acid stains may result unless parts are carefully cleaned of all acid after pickling or bright dipping. Thorough washing in cold water followed by a hot rinse is necessary to remove all traces of acid before drying. Pickling baths should not contain scraps of iron or steel, otherwise red stains may result from copper plating.

★ ★ ★

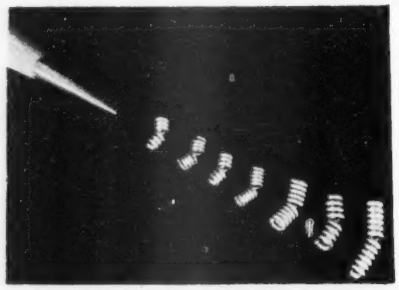


Fig. 10. The small beryllium copper wire forms shown are used as balance weights for instrument moving elements. (Courtesy Instrument Specialties Co.)

★ ★ ★

Beryllium copper can be plated for appearance, added protection, die lubrication and electrical properties with the following metals: Cadmium, zinc, tin, copper, chromium, nickel, silver, rhodium and gold. Some caution should be observed in coating critical elastic elements such as springs, since plating introduces excessive anelastic behavior as measured by drift and hysteresis. On the other hand, plating baths do not cause hydrogen embrittlement in beryllium copper, so that endurance will not be adversely influenced. In most cases, plating of beryllium copper wire is limited to either cadmium or silver.

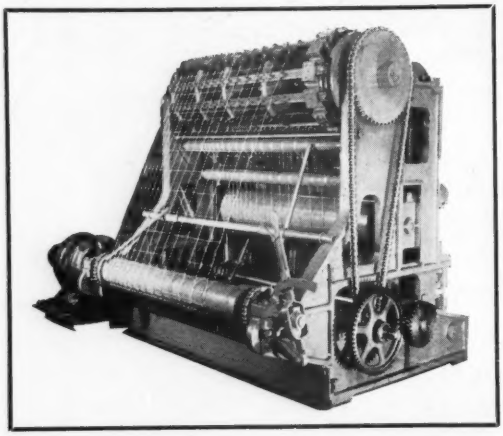
★ ★ ★

Joining

Although beryllium copper can be satisfactorily joined by soft soldering, silver brazing, carbon-, metal- or inert-arc and resistance welding, joining practice for wire is generally limited to soft soldering or silver brazing. Joining operations—except soft soldering—precede heat treating, because the temperatures involved are sufficiently high to rapidly soften beryllium copper. The relatively high electrical and thermal conductivity can be a factor in brazing the alloy, especially in joining with materials of decreased conductivity. In all cases, joints should be made at points of low concentration. Scale formed during either the solution or hardening treatments must be removed from the joint area (10).

★ ★ ★

INTERLOCKING FENCE LOOMS



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Applications

Various types of springs, including compression, extension, torsion, spiral and hair, constitute the first and most significant application of beryllium copper wire. Beryllium copper compression springs are finding increased use in a wide range of mechanical and electrical components. Typical applications are found in aircraft fuel pumps, thermostat controls, solenoid-operated valves, lighting switches, pressure cooker blow-out valves, time-delay relays, automobile heaters, machine gun trigger releases, circuit breakers, and pump valves. Of perhaps greatest significance, however, are the motor brush springs employed in fractional horsepower motors for aircraft dynamotors, portable tools, sewing machines and other home appliances. By applying more uniform brush pressure and through the elimination of the shunt or pigtain in many instances, these springs frequently provide substantial operating economies (11).

★ ★ ★

In addition to various types of springs, beryllium copper wire is also employed for base plugs in communication and electronic equipment, wave washers, musical instruments, plating hooks and accessories, and miscellaneous wire forms. Since pretempered material requires no heat treatment, it can be stranded into flexible conductors, leads, and nonmagnetic wire rope.

★ ★ ★

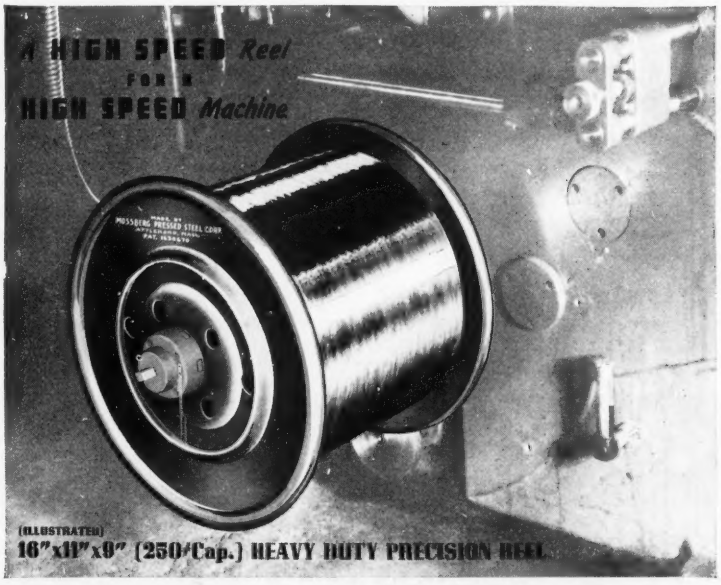
The choice between heat treatable or pretempered wire is largely dictated by the nature of the application and the combination of properties required. For example, pretempered material offers fabricating advantages through the elimination of the hardening treatment in the production of all types of springs. On the other hand, aging of heat treatable wire makes possible certain features not otherwise obtainable. These include closer control over dimensions, loads and spring rates through fixture hardening.

★ ★ ★

From a property standpoint, both materials are nonmagnetic, conductive and corrosion resistant. Fully heat treated wire offers slightly better elastic and endurance strength at room or moderately elevated temperatures as well as unusually high resistance to drift, relaxation or hysteresis. Greater freedom of design is attainable with heat treated material, since through manrel-coiling and stress-relief- hardening it is possible to fabricate springs from exceedingly light wire and relatively large index. In an extreme case, an extension spring of 301 turns has been produced for an unusually sensitive balance (12) from 0.007 in. diameter wire with an index (mean coil diameter/wire diameter) slightly over 45. By virtue of its own weight, it extends 436 per cent and has a spring rate or sensitivity of 273 inches per ounce or, in more usual units, 4360 inches per pound. A straight-line relationship for extension vs load was found throughout its entire working range.

★ ★ ★

Through mandrel-coiling, springs requiring different numbers of coils per inch along their length can be produced without difficulty. Although the standard load variation for a given deflection is $\pm$ 5 per cent, load tolerances can be held to $\pm$ 2 per cent by careful initial coiling. In the



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in HEAVY DUTY construction for use on modern HIGH SPEED wire drawing machines.

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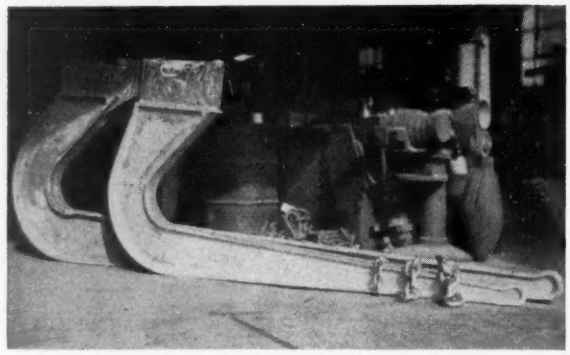

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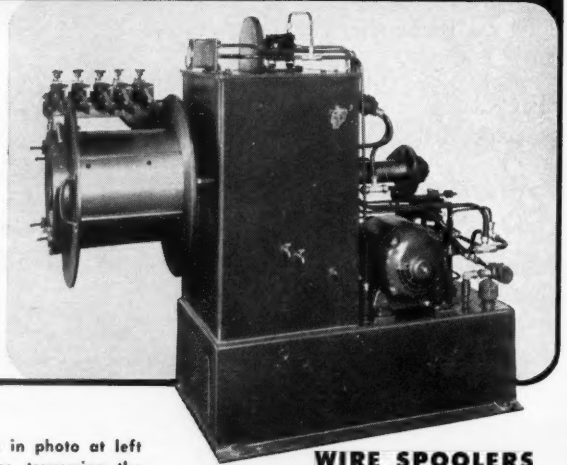

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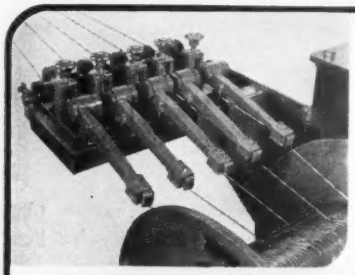

Method of coiling is shown in photo at left The complete block oscillates, traversing the wire into five 3" wide coils. Traverse and tension control are extremely accurate. 1/8" to 1/2" wide flat wire can be wound. Block has 16" inside diameter and 24" outside diameter.

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case of a coil spring for an adjustable pressure controller, the force exerted by the spring at its working length must be held within 2 per cent to provide the desired control of the pressure differential. For springs produced under ordinary conditions, springback in coiling affects free length, coil diameter and number of turns, necessitating 100 per cent testing and sorting after a careful stress-relieving treatment. Mandrel-coiled beryllium copper springs are supplied to sufficiently close tolerances to substantially reduce inspection and handling costs (13).

ACKNOWLEDGMENT

The author acknowledges the assistance of the following firms in providing data and illustrations used in this article:
Instrument Specialties Co., Inc.
Little Falls Alloys, Inc.

REFERENCES

1. **W. H. Bassett, "Beryllium-Copper Al-Aloys," Trans. Amer. Inst. Mining and Metallurgical Engrs., Vol. 75a, pp. 218-232 (1927).**
2. **G. Masing and C. Haase, "The Changes In the Modulus of Elasticity During the Age-Hardening of Beryllium-Copper Alloys," Wiss. Veroffentlich. Siemens-Konzern, Vol. 8, No. 1, pp. 142-148 (1929); also "Beryllium", translation by R. Rimbach and A. J. Michel, Reinhold Publishing Corp., New York (1932), pp. 171-179.**
3. **J. Delmonte, "Beryllium-Copper Wire has Unique Characteristics," Wire and Wire Products, Vol. 11, pp. 326, 327, 355 (1936).**
4. **"Age-Hardenable Beryllium-Copper," Wire Industry, Vol. 12, pp. 195-197 (1945).**
5. **F. S. Stickney, "Making Spring Grade Beryllium Copper Wire", Wire and Wire Products, Vol. 19, pp. 169-172 (1944).**
6. **M. J. Donachie, "Some Traits and Characteristics in the Working of Beryllium-Copper Wire," Wire and Wire Products, Vol. 20, pp. 719-721 (1945).**
7. **J. T. Richards, "A Review of Beryllium and Beryllium Alloys," Journal of Metals, Vol. 3, pp. 379-386 (1951).**
8. **J. T Richards, R. K. Levan and E. M. Smith, "The Influence of Cold Work and Heat Treatment on the Engineering Properties of Beryllium Copper Wire," Proceedings, Amer. Soc. Testing Mats., Vol. 51, (1951). In press.**
9. **"Beryllium Copper Formed Parts," Product Engineering, Vol. 18, pp. 118-121 (Feb. 1947).**
10. **J. T. Richards, "Welding, Brazing, Soldering Beryllium Copper," Welding Engineer, Vol. 35, No. 6, pp. 23-27; No. 7, pp. 36-39; No. 8, pp. 35-37 (1950).**
11. **R. W. Carson, "How to Design Brush Springs for Long Brush Life," Electrical Manufacturing, Vol. 30, pp. 61-65 (Sept. 1942).**
12. **F. G. Sawyer and D. F. Othmer, "Adsorption of Solvent Vapors on Commercial Activated Carbon," Ind. and Engr. Chem., Vol. 36, pp. 894-900 (Oct. 1944).**
13. **R. W. Carson, "Stress-Relief-Hardening of Beryllium Copper," Mechanical Engineering, Vol. 69, pp. 651-654 (Aug. 1947).**

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Announce New Universal pH Meter

A new Philips Universal pH Meter, precision built for reliable service and for quick, accurate measurements of hydrogen-ion concentrations, is now available from the Research & Control Instruments Division, **North American Philips Company, Inc.**, 750 South Fulton Avenue, Mount Vernon, New York.

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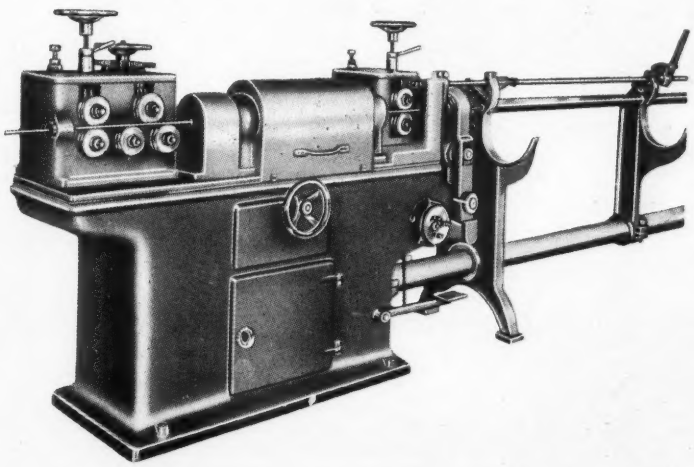

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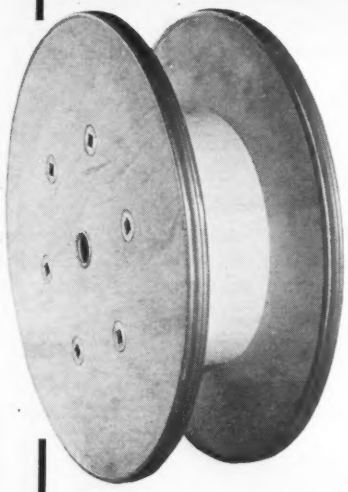

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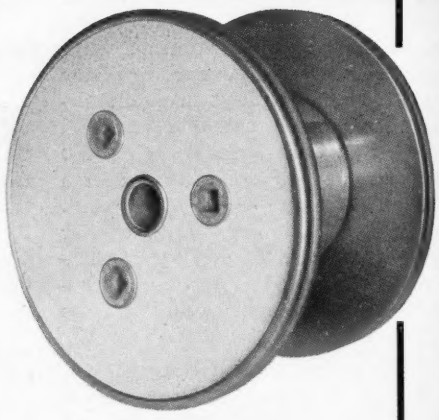

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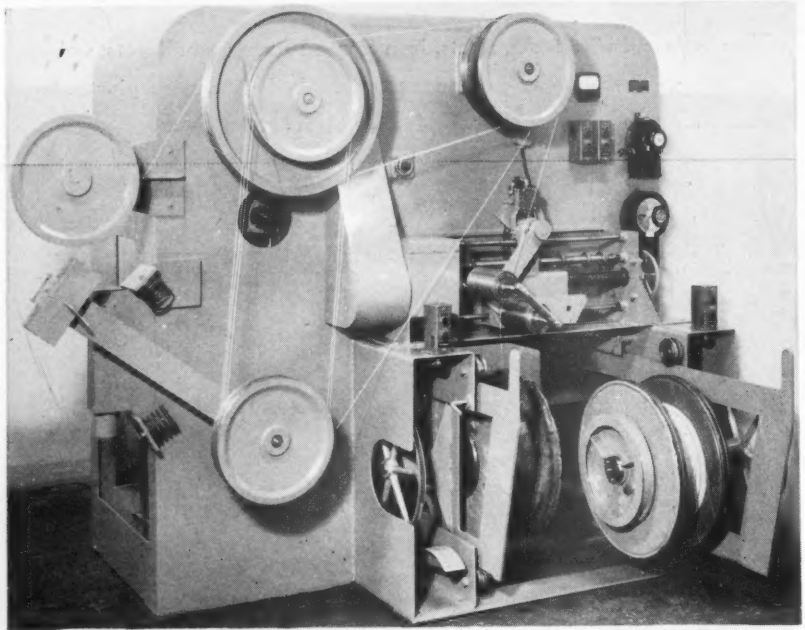

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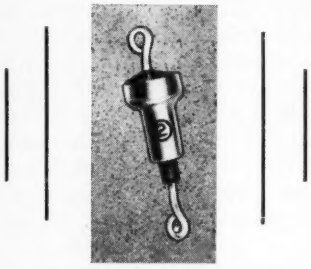
New Sprague Ferrule-Type Feed-Thru Capacitor

Type 503C, a small feed-thru Ceramic capacitor for filtering leads passing through a chassis, has been announced by the **Sprague Electric Company,** North Adams, Mass. Use of this new unit paves the way to marked efficiencies in the design and production of TV equipment.

★ ★ ★

For protection against humidity, the small ceramic disc element in the Sprague 503C capacitor is reinsealed in a recessed cup at the top of the metal ferrule. The thru-lead, passes through a hole in the center



Sprague Feed-Thru Capacitor

of this dielectric disc. Thus, there is equal radial distribution to the grounded outer shell of all high frequencies being by-passed. Rated at 500 volts d-c, capacitance values of the new units range up to 10mmf.

★ ★ ★

The Sprague Engineering Bulletin 605 containing full details is available on letterhead request to the manufacturer.

★ ★ ★

Reliance Electric Moves Into New Plant

The moving into their new plant by the **Reliance Electric & Engineering Company** was completed in December.

★ ★ ★

The new plant is located at 24701 Euclid Avenue on a 65-acre plot adjoining the Nickel Plate Railroad. Built in nine months at a cost of approximately $1,800,000, which includes certain production equipment and related service facilities, the plant is a single-story structure 442-ft. long and 352-ft. wide with a total floor area of 133,000 sq. ft.

★ ★ ★

This plant enables Reliance to centralize a number of its technical functions and facilities under one roof at a single location. These include engineering, research and development laboratories; the manufacture of electronic equipment and motor drive controls; renewal parts and customer service activities, and the design, development and manufacture of specialized tools required by the company's other plants.

★ ★ ★

Besides the new Euclid facility, Reliance operates two Cleveland plants on Ivanhoe Road. These and the Ashtabula Plant will be retained.

★ ★ ★

National Electric Products Philadelphia Warehouse Moved to Linden

Announcement has been made by **National Electric Products Corporation,** Pittsburgh, that, effective in January, 1952, its Philadelphia warehouse will be closed, and its operations transferred to the Corporation's new million-dollar manufacturing plant recently acquired in Linden, New Jersey. At the same time National Electric's Philadelphia Sales Office will be removed

precision wire straightening and cutting for all industry...

Whenever your wire straightening or cutting problem calls for close tolerances and uniform quality, it will pay you to take advantage of Pittsburgh Cut Wire's long experience to all industry. Expert workmanship and exact machining to your specifications for more than a decade, combine to give you the experience that will serve you best. Call on us for your wire straightening and cutting needs.

Straightening & Cutting in diameter ranges from 1/16" to .005" in all types of wire.

Pittsburgh cut wire company

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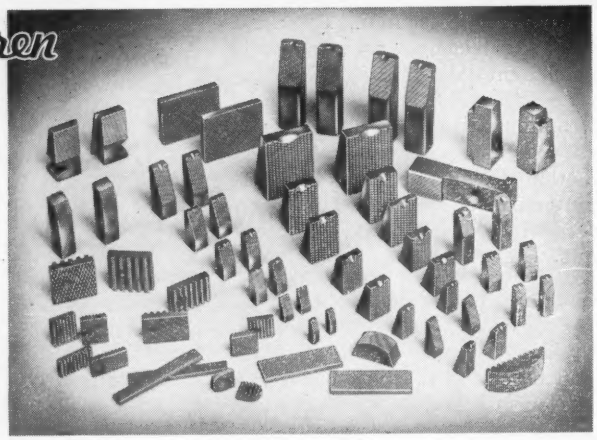
Sjogren

JAWS . . . . for Wedge Grips, Pullers and Tensile Testing Machines of all makes are available either from stock or manufactured to order. A Sjogren jaw, made to meet your requirements, guarantees you service.



Our Silver 25 1927-1952 Anniversary Year

SJOGREN TOOL AND MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 SWORD STREET
AUBURN
MASSACHUSETTS

Represented in Canada by THE LARSON CO., 98 Wellington St., West, Toronto, Ont.

2 NEW ELECTRIC PRODUCTIMETERS

"CS" and "Y"
ELECTRIC PRODUCTIMETERS
The answer to all electric counting requirements

Two Companion Counters . . . Two Sizes . . .
Hi-Speed . . . Accurate . . . Long Life . . . Totally Enclosed

Speeds of 1000 counts per minute. Both counters give maximum readability. Design fits all mounting conditions . . . panel mounting or base mounting. Hardened steel working parts for long life and dependability.

New type case for compactness, rigidity, and protection against dust and moisture conditions. Operate accurately over wide current fluctuations.

DURANT MANUFACTURING CO.
1918 N. Buffum St. Milwaukee 1, Wis.
118 Orange St. Providence 3, R. I.
Representatives in Principal Cities

Write for "New Electrics" Bulletin

PRODUCTIMETERS SINCE 1879 Count Everything

from 1234 Hamilton Street, to Suit 404-5-6 Architects Building, 17th and Sansom Streets. **Lloyd Clark**, is the District Manager.

★ ★ ★

In the new Linden Plant National Electric will manufacture Rigid Conduit Thinwall, armored cable, boxes, connectors, Busway, Nepcoduct and many other items. It will still retain its original plant and manufacturing facilities in Ambridge, Pa., adjacent to the Pittsburgh manufacturing area, as well as its large plant in Torrance, Calif., which serves the West Coast area.

★ ★ ★

The Nickel Industry in 1951

The free world's production of nickel for the full year of 1951 will approximate 295,000,000 pounds, an increase of more than 10 per cent over 1950, according to a review of the nickel industry by **Dr. John F. Thompson**, Chairman and President of **The International Nickel Company of Canada, Limited.**

★ ★ ★

Canadian producers, the review states, were responsible for 275,000,000 pounds, or more than 90 per cent, of the free world's total this year. In 1950, Canada produced 247,000,000 pounds of nickel in all forms.

★ ★ ★

Reliable estimates of nickel production in Soviet Russia and satellite countries are not available, but trade sources believe that the free world's total is several times greater than that behind the Iron Curtain.

★ ★ ★

Measures to maintain this superiority in nickel supply were taken during the year by established nickel producers as well as new potential producers, in a number of instances with government co-operation. These efforts will assure continuance of the amounts now available and are expected also by 1954 to provide an increase of approximately 30 per cent over that available before the Korean conflict.

★ ★ ★

Spectrographers to Meet in May

The American Association of Spectrographers is planning a symposium on "Instrumental Methods of Analysis in the Non-Ferrous Industry." This will be held in Chicago in May, 1952.

Your Scrap — Turn It In

The National Production Authority has issued a reminder bulletin calling attention to the fact that the amount of material available to metal users will be determined by the amount of scrap turned in.

★ ★ ★

The defense production effort has a voracious appetite for metals and if enough scrap is not found, metal production of all kinds will be slowed down. The Government will have first call on metals and the manufacture of products for civilian consumption is bound to suffer acutely from the shortages. Scrap of all kinds is needed—steel, iron, copper, brass, bronze, aluminum lead and zinc.

★ ★ ★

Many concerns are doing a conscientious scrap salvage job—but lots of others are not. Even though your scrap contributions may seem small, in the aggregate—if all work at it—the results will be tremendous. Therefore, you who have no program, please set one up and TURN THAT SCRAP IN—regularly.

★ ★ ★

Re-sellers of copper wire mill products also have been placed under Amendment 6 to CPR67, having previously been placed under CPR-67.

★ ★ ★

The Gilbert & Bennett Story

(*Continued from page* 167)

they were made. What was to be done with it? Somebody with a bright idea thought of making window screens.

★ ★ ★

Thus the wire originally intended for sieves was painted and made into something else. The screens sold like hotcakes and opened up a new field for Gilbert and Bennett.

★ ★ ★

It may be hard to conceive that horsehair could have had any part in this world of steel and mechanical power. But in the wire industry, horsehair was the precursor of steel. Before Gilbert and Bennett began to make history more than a century ago, it had been part of a woman's household chores to devote some of her spare time to making the sieves through which she sifted

RUSTPROOF WATER!

Make this convincing test* with

IMMUNOL

Neutral, non-inflammable, odorless and non-toxic IMMUNOL added to any water will immunize that water against causing rust and at the same time makes a powerful detergent and wetting agent. Parts treated are protected by a clean, non-oily, invisible film.

*Add a small quantity of IMMUNOL to one of two jars containing plain water. Put a screw in each of the jars. Observe them after a day or a week. One screw will be rusted; the other in the IMMUNOL solution will be bright and clean.

Send for Booklet

HAAS MILLER CORP.

4TH & BRISTOL STS.

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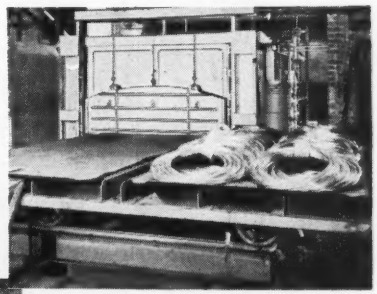
ROCKWELL FURNACES

Gas · Oil · Electric

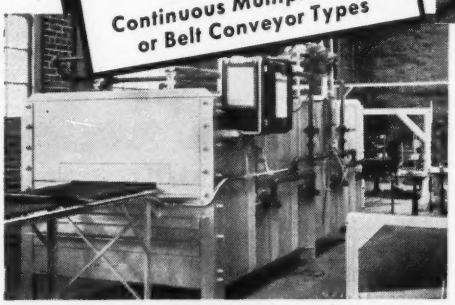
Direct·Muffle·Atmosphere

Batch Pan—Car—Pit or Hood Types

Continuous Multiple Strand or Belt Conveyor Types



Gas-fired, atmosphere controlled, pan type batch furnace for annealing brass wire in coils.



Gas-fired furnace for bright annealing steel, stainless steel and non-ferrous wire running continuously through tubes in furnace.

ROCKWELL ALSO BUILDS *Coil winding machines, reels and spools; pickling, brushing, cleaning, washing, finishing, drying and handling equipment; ovens and dryers; special fabrications; non-ferrous rod mills.*

ROCKWELL SINCE 1888 BUILT

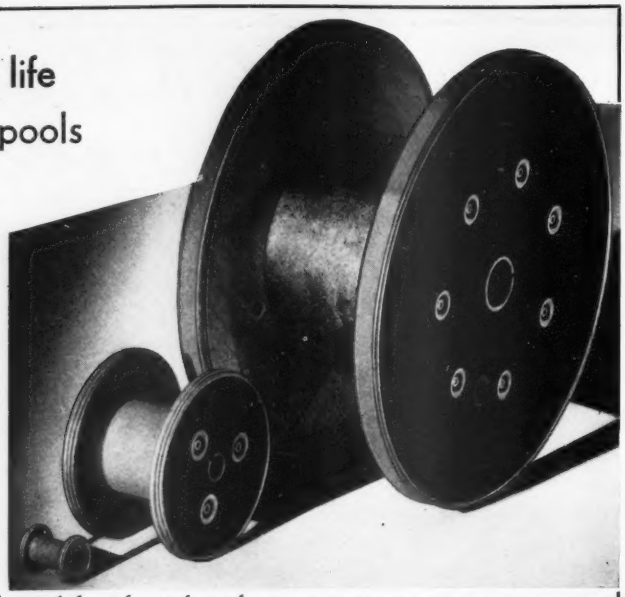
FURNACES · OVENS · SPECIAL MACHINERY

W. S. ROCKWELL COMPANY

242 ELIOT STREET · FAIRFIELD, CONN.

In Canada: Francis Hankin & Co., Ltd. Montreal & Toronto

for longer life
shipping spools
and reels



Hubbard metal bound spools and reels for shipping are ruggedly built to withstand all the shock and impact normally found in transporting spooled wire. Head is plywood with die formed steel tire. Design provides a light weight spool or reel with long wear life. Write for information and prices.

HUBBARD SPOOL COMPANY
GARRETT, INDIANA
Phone: GARRETT 840

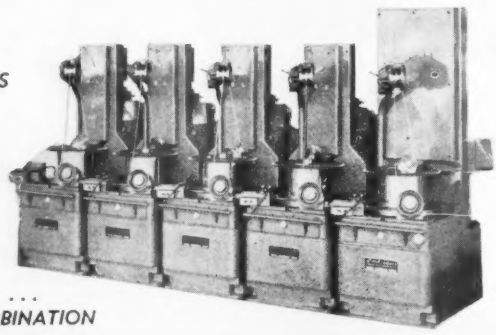
STEEL SPOOLS AND REELS . . . METAL BOUND SPOOLS AND REELS . . . STEEL TRAVERSES . . . LIGHT WEIGHT REELS WOOD REELS

Hubbard

AETNA-STANDARD
WIRE DRAWING UNIT

- DESIGNED FOR COMPLETE VERSATILITY
- BUILT FOR SAFE, EFFICIENT PRODUCTION
- SINGLE OR MULTI-DRAFT OPERATION
- INTERCHANGEABLE UNITS AND PARTS
- AUTO-RHEOSTATIC SYNCHRONIZATION
- WATER COOLED BLOCKS AND DIES

FERROUS OR NON-FERROUS



WET OR DRY LUBRICANTS

SINGLE UNIT . . .
OR ANY COMBINATION

THE AETNA-STANDARD ENGINEERING CO.
PITTSBURGH, PA.

ASSOCIATED COMPANIES: HEAD, WRIGHTSON & COMPANY, LTD., THORNABY-ON-TEES, ENGLAND
AETNA-STANDARD ENGINEERING COMPANY, LTD. . . . TORONTO, ONTARIO, CANADA

meal from bran. She used horsehair to weave these sieves.

★ ★ ★

A shoemaker brought about the transition from woman's work to large scale industry. He lived in Weston and his name was Benjamin Gilbert. He was born about a decade after the signing of the Declaration of Independence. Gilbert was a cobbler, but apparently not a very good one. Though he moved from settlement to settlement trying to make a go of his trade, he invariably found other cobblers in the neighborhood who seemed to make better shoes than he.

★ ★ ★

Of Shoes and Ships and Sieves

Benjamin Gilbert finally decided he was a failure at shoemaking and joined his wife and daughters in making sieves. The women continued to do weaving of horsehair and Gilbert made hoops of wood for the rims.

★ ★ ★

People liked Benjamin Gilbert's wood rimmed sieves better than they liked his shoes. His venture prospered. He expanded it by adding on the business of collecting and preparing hog bristles for bedding and furniture.

★ ★ ★

The Gilbert enterprise grew to such proportions that he moved it out of his home to an old saw mill and later to a building in Georgetown which still exists today as Connery's General Store. When Sturges Bennett became Gilbert's partner in 1828, the firm of Gilbert and Bennett was launched on its phenomenal career.

★ ★ ★

Six years later the firm undertook to make something better than sieves of horsehair. Mr. Gilbert had observed a neighbor's carpet loom and conceived the idea of weaving wire. The neighbor let him use the loom for the experiment and by 1834 the firm of Gilbert, Bennett and Company, was all set to weave sieves of wire. At the same time they began to make wire cloth.

★ ★ ★

Early in the 1830's the firm also began to employ machinery in the manufacture of wooden rims for sieves. Construction of the first wire mill was completed in 1863 and

two years later, Gilbert, Bennett and Company introduced the first power machinery ever used in this country in the manufacturing of wire netting. Glue making also had been added as the logical by-product of an enterprise whose basic raw materials had been horsehair and bristles.

★ ★ ★

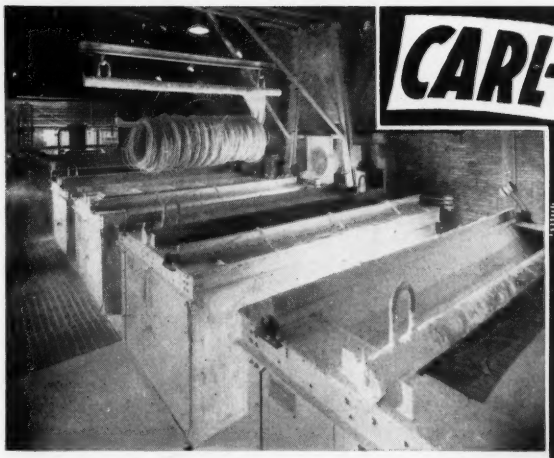
A River Dispossessed

At this moment of transition from ancient ways to the streamlined fashion of 1951, this tangible evidence of the past also rubs elbows with the present. Within the modern gates still stands the old glue factory, a mustard colored building with small windows, which would have been a typical subject for a Currier and Ives lithograph. It stands on the bank of the Norwalk River, reduced today to a forlorn trickle. When the glue factory was in its prime the Norwalk River flowed through the property with pride and power. In those days it was the chief partner of Gilbert and Bennett, for it was the driving force that made the wheels go round.

★ ★ ★

Today electric power has replaced water power and the Norwalk River seems to run through the property as if by sufferance. The old glue factory likewise has been taken down a peg or two, for today it is living out its old age as a warehouse. Its hand hewn beams still in evidence to delight the antiquarian and handmade square iron nails with square heads still holds parts of the building together. Some of its siding is fitted to open and shut like louver boards. This arrangement served a definite purpose in the glue making era, permitting cross currents of air to circulate through the building when the glue was being dried. During the short period that Gilbert, Bennett and Company turned their hand to glue making they also managed to add important improvements to its method of manufacture. The firm originated the method of drying glue on wire netting, replacing the sticky process of drying it on cotton netting. More than 70 years ago, however, Gilbert and Bennett sold out their glue making interest.

★ ★ ★



CARL-MAYER
HI-SPEED REGISTERED
ROD BAKERS

PATENT Nos.
U.S.A.
2,235,559
2,296,361
2,323,828
CANADA
396,144
401,589

ALSO OTHER TYPES OF INDUSTRIAL OVENS AND FURNACES

GREATER SPEED AND FUEL ECONOMY PROVES OUTSTANDING ENGINEERING

Carl-Mayer Hi-Speed Rod Bakers have an exclusive heating arrangement, combining faster baking with amazing fuel economy — and a patented Blow-Off feature which removes moisture without bumping or agitating the coils. *WRITE FOR BULLETIN NO. 350.*

SERVING CONCERNS LIKE THESE:

American Steel & Wire Co.
Atlantic Wire Co.
Atlas Steel Co.
Atlas Tack Corp.
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Canadian Steel Corporation.
California Wire Cloth Corp.
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Gary Screw & Bolt Division of Pittsburgh Screw & Bolt Corp.
Hollup Corp.
Indiana Steel & Wire Co.
Johnson & Nephew, Ltd.
Jones & Laughlin Steel Corp.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
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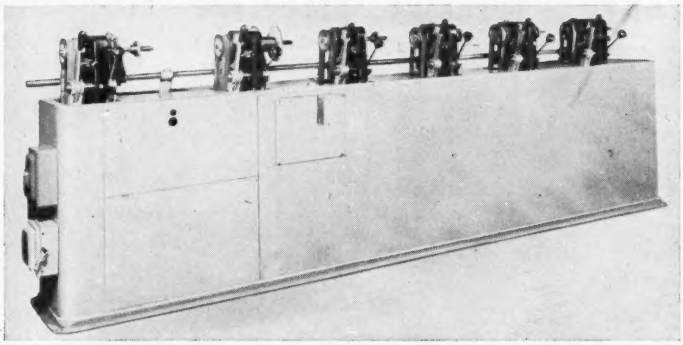
THE CARL-MAYER CORPORATION
3030 EUCLID AVENUE
CLEVELAND, OHIO



NO. 1900K MULTIPLE SPINDLE SPOOLER

This spooler is outstanding for its many unusual and desirable features.

Takes spools up to 16" flange diameter. Enclosed types, with mechanism readily accessible from rear side. Spindles mounted on ball bearings and each may be stopped or started individually. Uses Worthington All-Speed Drive unit.

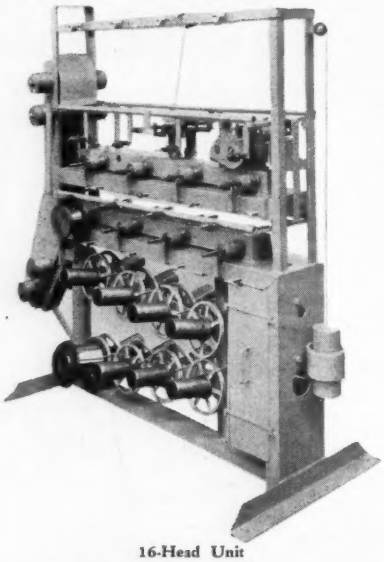
All Emory Spoolers supplied standard or equipped to meet customers' special specifications.

On Spooling problems, consult

ROBERT J. EMORY COMPANY

31 EAST RUNYON STREET NEWARK 5, NEW JERSEY

New! ENAMEL WIRE TAKE-UP New!



16-Head Unit

Take-Up and Pay Off Handles B&S No. 26 to B&S No. 40.

Amazing New Clutch Guaranteed Trouble-Free.

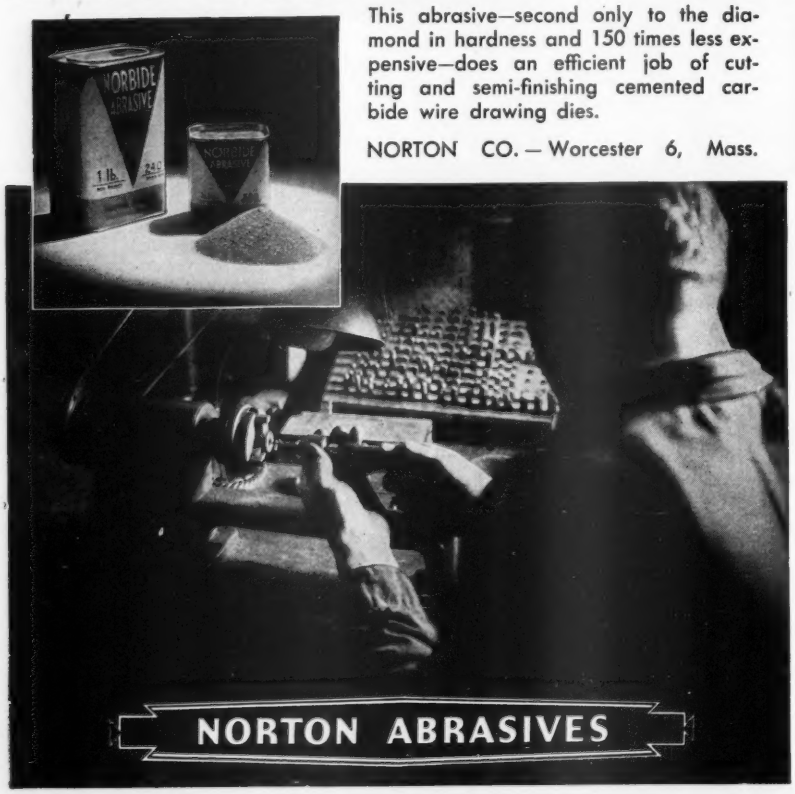
Assures Even Steady Tension On The Wire.

All Moving Parts Lubricated For Life.

We Build Horizontal and Vertical Units To Fit Your Present Ovens.

COOK MANUFACTURING CO.
265 North 9th Street
Paterson 2, N. J.

NORBIDE Abrasive: Effective, Economical



This abrasive—second only to the diamond in hardness and 150 times less expensive—does an efficient job of cutting and semi-finishing cemented carbide wire drawing dies.

NORTON CO. — Worcester 6, Mass.

Just as the past and present are linked in the mechanical history of Gilbert and Bennett, so too the management is a combination of yesterday and today. The president of the firm is **D. Henry Miller** of Cannondale, who succeeded to the office in 1936 after the death of his father, **Samuel J. Miller.** The latter had been with the organization for more than a half a century, joining it shortly after the Civil War. He became assistant superintendent in 1876 and rose through successive offices to the presidency in 1915.

★ ★ ★

Charles Miller, uncle of D. Henry Miller and brother of Samuel J. Miller, became the manager of the western plant in 1936 and a member of the board of directors of the company.

★ ★ ★

The vice president of the firm is **John H. Mulliken.** For a decade he has helped guide the destinies of the Gilbert and Bennett Manufacturing Company, coming to it in 1940 as secretary and succeeding to his present office a few years later.

★ ★ ★

Most of the officers who have carried on the enterprise are linked with the days when it was founded as a cottage industry in the home of Benjamin Gilbert. He was sole owner of the business from 1818 to 1828. In 1828 he admitted his son-in-law, Sturges Bennett, as his partner. The partnership became Gilbert, Bennett and Company in 1832, when Benjamin Gilbert's son, **William J. Gilbert,** joined the firm. The firm name continued in this wise for 42 years, until in 1874, the company was incorporated under its present name, The Gilbert and Bennett Manufacturing Company.

★ ★ ★

Sturges Bennett, original partner of the founder, became the first president of the new corporation. He continued to serve alternate one-year terms until his death in 1880, when he was followed in office by William J. Gilbert, son of the founder. After serving four years, William J. Gilbert was succeeded by Edwin Gilbert who was president from 1884 to 1906. Then David H. Miller, better known as "Major Miller" became president

SAVE TIN!

with

STANNOUS SULFATE

Use of Stannous Sulfate for liquor finishing baths saves tin, assures more efficient processing.

for **ALL LIQUOR FINISHING of STEEL WIRE**

white or straw color

M & T Stannous Sulfate provides these advantages:

- **Reduces tin losses by eliminating the high tin sludging common to the acidulated feather tin process.**
- **Makes it easier to control results because only two variables (the Stannous Sulfate and Copper Sulfate concentrations), require watching.**
- **Produces smooth, uniform, wire coatings from day to day and from lot to lot.**

Write for engineering data on the use of Stannous Sulfate in liquor finishing operations.

METAL & THERMIT CORPORATION
Specialists on Tin and Tin Chemicals
100 East 42nd Street • New York 17, N. Y.

until 1915, when Samuel J. Miller succeeded him. Through Samuel Miller, the firm's history moves on to the present day.

★ ★ ★

A Week's Production Could Encircle the Earth

Today it would take about a year and a quarter to smother all of nearby Wilton's hills and valleys under Gilbert & Bennett woven wire goods. At their present rate of production Gilbert & Bennett could encircle the earth about one and a half times each week with the fine wire it draws for weaving into screen cloth. Currently, with proper rod supply available, the company could draw three quarters of a thousand million feet of wire in one year in the wire mill. The making of screen cloth, by the way, is one of the minor phases of the Gilbert & Bennett activities which is to be further developed in the next few years. Yet even at the present rate of production, five years would be long enough to cover Wilton's 28 square miles with Gilbert & Bennett screen wire.

★ ★ ★

Before the post-war changes were put into effect, manpower handled the 300 pound coils of steel rods. A single foot of rod is sufficient to make 500 feet of the fine wire used in weaving screen cloth.

★ ★ ★

Celebrating In 1893

As long ago as 1893, Gilbert and Bennett were outstanding in the wire manufacturing field. This was the year of the Columbian Exposition and the firm was celebrating its 75th anniversary. Already the Chicago factory was running full tilt. Gilbert and Bennett also had two retail shops, one in New York City and another in Chicago. The firm employed more than 300 workers. The mechanical improvements which it had installed in 1893 caused the company to boast that it was producing in 1893 with 250 men a volume of wire products it would have taken about 1,500 men to produce with the appliances in use in 1863.

★ ★ ★

The Gilbert & Bennett products of 1893 contains many items still in use today. Among them also are

S. A. ETECO
ZWEVEGEM
(BELGIUM)

STEEL WIRES

IF YOU REQUIRE

NO CMP REQUIRED

Submit your SPECIFICATIONS To The REPRESENTATIVES:

J. GERBER & CO., INC.
855 Avenue of Americas
NEW YORK 1, N. Y.

BORAX

COATS STEEL RODS WITH JUST

ONE DIP!

Check The Advantages Borax Offers:

√ BETTER WORKING CONDITIONS

Borax is clean, dust-free, nonflaking

√ FASTER BUTT WELDING

Borax is a natural flux—butts are ready

√ FASTER ACID NEUTRALIZING

Borax is an effective mild alkali

√ LONGER STORAGE SAFETY

Borax is protection against rust

√ SPEEDIER PRODUCTION

Borax film is tight, pliable, nonflaking

√ LONGER DIE LIFE

Borax is an excellent lubricant carrier

WRITE FOR FULL INFORMATION

PACIFIC COAST BORAX CO.

DIVISION OF BORAX CONSOLIDATED, LIMITED

NEW YORK • CHICAGO

LOS ANGELES • CLEVELAND

PHILADELPHIA

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

items quaintly reminiscent of the days when the United States was preponderantly an agricultural nation, when skill of hand was man's greatest asset. It was before paved roads, telephones and plumbing were taken for granted.

★ ★ ★

Those Were the Days

Those were the days when everybody had the wire flower stands which today are collectors' items, also the wire umbrella stands. Gilbert & Bennett made them along with the coal hods, wire partitions to separate the "counting room" from the store, also oat sieves, stove guards, dish cloth holders, wire bird nests, bread and cake coolers and doormats. They also made stable fixtures such as hayracks, salt dishes, oat mangers and stall guards.

★ ★ ★

The Climax Rat Trap with its "novel tilting platform" was hailed as one of Gilbert & Bennett's specialties as well as a great necessity. High praise was given to a special basket for package carriers which the firm would make to order so that the size would be just right for the kind of merchandise it was to carry through the air from the counter to wrapper and changemaker and back again.

★ ★ ★

There was also Gilbert's Rival Ash Sifter depicted in a brochure dated 1893. The super duper gadget, which was a necessity in every household in the days of the coal stove, is sketched in a line drawing. A youth operates it. The drawing depicts him as a somber lad clad in a sailor blouse, long black stockings, knickers and a hat apparently suitable for the occasion. He is making the Gilbert and Bennett special perform over a wooden barrel. To all appearances the youth is muttering to himself that he was born too soon and that he would have been far happier to pose for Gilbert & Bennett in this, our era of oil burners.

★ ★ ★

Standard Costs in Wire Cloth Manufacture

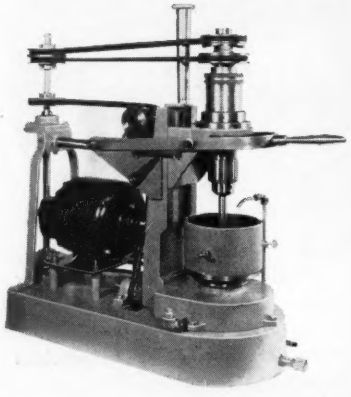
(*Continued from page* 165)

question again affords the data for calculation of the standard in terms

NEW!

ROOS

Industrial Type LAPPING or RIPPING MACHINE for Tungsten Carbide LARGE DIES



- Capacity up to 5" die casings.
- Chuck capacity ⅜" to ¾" lapping pins.
- New "V" Type drive belts.
- ½ H.P. motor.
- Famous Roos revolving table for efficiency and time saving.
- Prompt delivery schedule.

ROOS TOOL & MFG. COMPANY

33-35 Bloomfield Avenue, Newark, N. J.

Factory—

17-19 Grove St., Montclair, N. J.

(Suburb of Newark)

Also Distributed by Carboloy Company, Detroit, Mich., and Canadian General Electric Company, Toronto, Can., or your Die Room Supply dealer.

of this unit. However, supposing the mesh to be 18 x 14, we must, since we are dealing with the mesh for one direction only (18 wires per inch), use as weight per hundred square feet one half the weight of woven 18 x 18 mesh.

★ ★ ★

Warp winding, the labor operation which follows, is considered here as being on an hourly pay basis. The average number of hours required to wind a 30″ warp, multiplied by the rate per hour, gives the total cost for the number of feet wound, which is then divided by the total number of square feet the warp will produce in finished cloth. Simple multiplication of this result by one hundred yields the standard cost per hundred square feet for the warp winding operation.

★ ★ ★

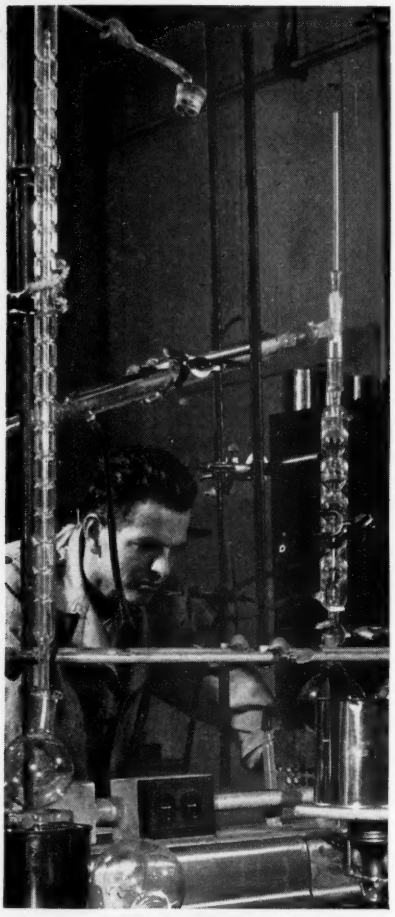
Standard cost for the bobbin winding operation is determined similarly to that for spool winding except that (again supposing we are dealing with 18 x 14 mesh) we must use as a weight unit one half the weight per one hundred square feet of woven 14 x 14 mesh.

★ ★ ★

To determine the weaving cost per hundred square feet, assuming that weavers are paid on an hourly basis, we must first determine the average square foot production per hour. This, multiplied by the number of looms one weaver operates (twelve has been suggested), and divided by the pay rate per hour, will result in a unit cost square foot for the weaving operation and is readily convertible to the hundred square foot unit. Standards for loom fixing, tension adjustment and cloth removal can be determined in like manner after it has been ascertained over what area the jurisdiction of the crews extends.

★ ★ ★

When the foregoing costs are assembled, we will then have the total winding and weaving direct labor cost for the given mesh and grade, irrespective of width. Since insect wire screening is generally produced in standard widths from 24″ to 48″ in two-inch steps, it will be found that working from 30″ as a base will result in a sufficiently accurately standard for any width of a mesh of a specific gauge and grade.



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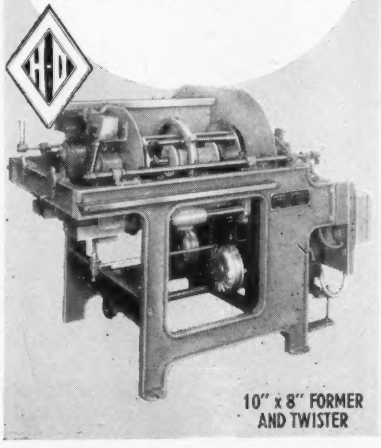

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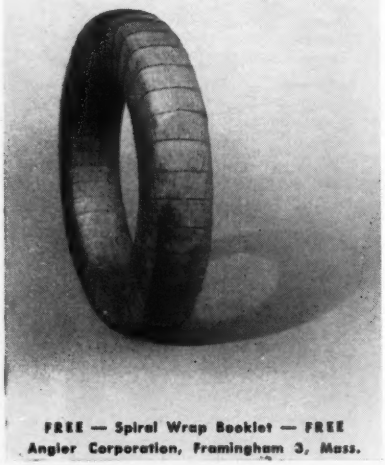

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Finishing Material Standards

When it comes to finishing, there is added material cost. Again steel mesh will supply the example. Standard practice dictates that a fixed percentage of zinc be deposited on the cloth. For the purpose of illustration, it may be assumed that this ratio is to be 5½ per cent and that the mesh is again 18 x 14. In this instance 5½ per cent of 12.8 pounds (which is the weight per hundred square feet of 18 x 14 mesh) will give the number of pounds of zinc to be deposited on one hundred square feet of cloth. This figure, multiplied by the cost per hundred pounds of zinc anodes, gives the material cost per one hundred square feet of wire.

★ ★ ★

In the event that a lacquer finish is also applied in this operation, the additional material cost is determined on an area basis by dividing the cost per gallon of the mixture used by the coverage per gallon. Once the standard painting mixture has been established, it is worked out to a cost per gallon which is divided by the number of square feet covered per gallon to arrive at the unit painting cost for the product.

★ ★ ★

Standard packing and wrapping material cost is determined quite simply. The principal material items in packing are bungs, cartons and paper. The cost per hundred square foot of cloth for cartons can be determined fairly accurately by dividing the number of square feet in a 100 foot roll 30" wide into the cost of the carton. If the roll is wrapped in paper, cost can be determined by dividing the square feet of wire cloth contained in the roll into the cost of the weight of paper required, together with the cost of bungs used (inserts in the ends of each roll).

★ ★ ★

Finishing Direct Labor Standard

The direct labor cost for electrogalvanizing per hundred square feet of cloth can be determined by ascertaining the speed at which each mesh is run through the tanks on a

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basis of direct labor cost per tank hour. The unit cost for direct labor on painting is also determined by the average number of square feet produced per tank hour and, of course, is based on full capacity. Variances will result if all vats are not operated to capacity.

★ ★ ★

The packing department has two classes of direct labor, one of which is winding and inspecting and the other papering. The direct labor cost per unit for winding can be determined from the average number of square feet turned out within a given time by an operator and the papering cost can be determined in like manner.

★ ★ ★

Overhead Standards

From the description of the composition of this standard, it will be apparent that losses on wire wasted are not charged as part of the material cost. They are deducted from the total amount of wire used from stores so that the net wire used in cloth produced can readily be matched against the standard amount required and wire variances thus confined to price, weight differences due to off gauge wire, or inventory errors.

★ ★ ★

Waste wire losses are picked up as a direct overhead item to which are added any other losses sustained from defects in weaving. These are ordinarily disclosed in the inspecting and wrapping operation. In the determination of the unit standard cost for losses, historical data must be largely relied upon. On determination, the allowance is worked out as a fixed percentage of the standard unit material cost of wire.

★ ★ ★

The calculation of a standard unit cost for each of the other direct (cost center) overhead items is arrived at on historical data as to cost per loom hour for direct overhead expense exclusive of losses. Total cost per loom hour divided by the hourly production for each mesh will result in the unit overhead cost per hundred square feet for direct overhead for the product. Standard cost of items of overhead can be determined for each mesh in a similar manner, to the extent

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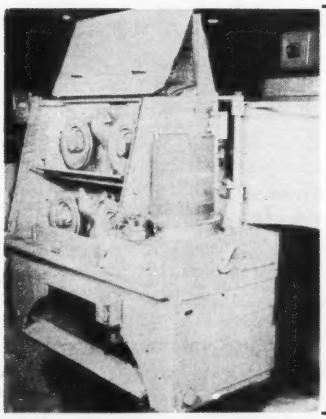

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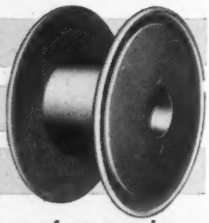

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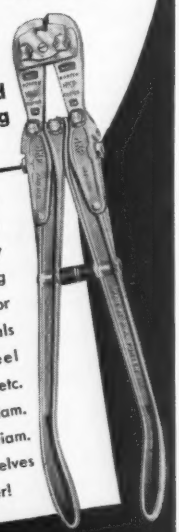

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necessary, on the basis of available historical data.

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Mill service standard costs (plant as distinguished from cost center overhead) are determined in ratio to the sum of direct labor and direct overhead. The combined unit cost of direct labor and direct overhead for any given mesh is multiplied by the burden percentage thus computed to obtain general burden standard cost.

★ ★ ★

Naturally, the determination of the burden percentage should be based on an estimated production schedule. It is obvious that this percentage will fluctuate with any changes in production. However, when this happens, the variation between actual and standard burden cost can readily be explained as a volume variance.

★ ★ ★

As with direct overhead for winding and weaving, there is historical data available to determine a standard unit cost of cost center overhead for electro-galvanizing, lacquering and painting. When calculated on any one mesh, this overhead cost can be re-worked to cover any other mesh desired. This is particularly true because the speeds are varied in proportion to the mesh of wire being plated. The plant burden percentage is the same as is used for winding and weaving and is applied to direct finishing costs of a particular mesh in the same way, *i.e.*, the burden percentage is multiplied by total unit cost of direct labor and direct overhead for the particular finishing operation.

★ ★ ★

Direct overhead items for the packing and wrapping center can usually be broken down from historical data to determine the total cost of direct overhead which, together with the burden cost obtained in the same manner as for previous operations, gives the total unit standard cost of the final operation.

★ ★ ★

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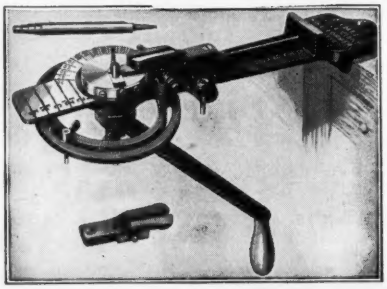

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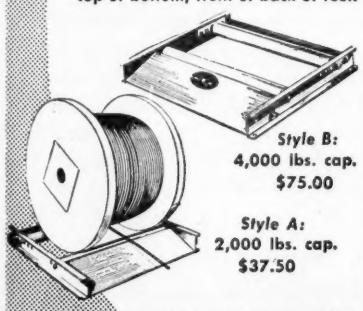

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any particular instance. It remains to apply these standards to the accounting procedure for production, inventories and sales.

★ ★ ★

After the current month's production sheets have been compiled to show the total square feet produced in each mesh and grade, the unit standard cost for each item of cost in each cost center is applied and extended for the number of square feet produced. The resulting total is the aggregate standard cost of production for the month. Actual costs for the same period, analyzed to corrspond with the standards classifications, are accumulated from payroll analysis, analysis of purchase register and journal entries. Detail of material and supplies usage goes back to perpetual inventory records.

★ ★ ★

When total actual cost of production has been assembled, manufacturing cost variance is determined and entered directly to cost of sales. In like manner, all sales are costed at standard and from this tabulation the total standard cost of sales is obtained. (If it is desired to state finished goods inventories at approximate actual costs, this can readily be done by determining the percentage of manufacturing cost variance to total standard cost and adjusting the inventory value by this percentage.) Upon completion of these steps, actual and standard cost of production, standard cost of sales, and value of semi-finished and finished goods inventories are available. In addition, manufacturing cost variance has been ascertained.

★ ★ ★

The monthly reports can now be prepared from the work sheets of actual and standard cost compilations. A report is issued to management, showing in one column the actual cost of each item in each cost center, in another the standard cost, and in a third column the related variance. It is also essential to explain the cause of unusual variances. These may have been caused by price changes, extraordinary expense (as may sometimes be the case in repairs), changes in production methods or rate, inventory errors, etc.

★ ★ ★

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★ ★ ★

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★ ★ ★

Making Satisfactory Welded Joints in Wire by Resistance Welding

(Continued from page 163)

sound welds. Provision for this flow of water is made in most commercial electrodes, but where special electrodes are made or ordered, care should be taken to see that this feature is included in their design.

★ ★ ★

While the majority of fabricators of wire products use flat electrodes or dies for crossed-wire welding, in some cases there are advantages from the shaping of the dies to fit the diameters of the wire or rods being welded. Such shaping makes for a better contact between the electrodes and the work and this reduces the contact resistance at that point, helping to eliminate arcing and any possible resultant marking of the wires. It may also contribute to a small reduction in power consumption due to lower contact resistance. Shaped dies are best suited to long production runs of similar products. In Fig. 1 can be noted the type of electrode holders and the electrodes usually supplied with a press type welder.

★ ★ ★

3. Welding Force or Pressure

To determine the pressure required in making the type of weld desired, several factors must be taken into consideration; the wire diameter, the percent set-down, the weld strength wanted, the appearance sought, and the mechanical and

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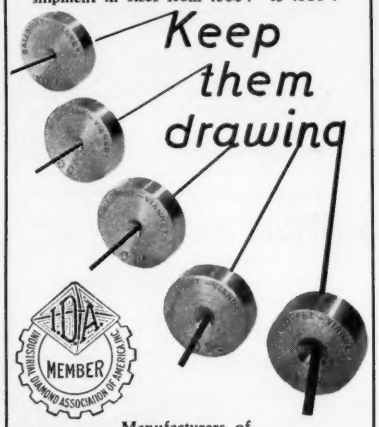
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electrical capacity of the welder being used. As illustrated in Fig. 3, the pressure should be great enough to secure a weld of proper appearance. Proper pressures are given in the chart, Fig. 2, and must be followed unless a longer time is used, which will naturally decrease production. A lower pressure and longer time in welding will not produce as strong welds as where the chart data is followed, and it is recommended that this be adhered to as closely as possible.

★ ★ ★

Lower weld strengths will also result where greater pressures are used than those shown in the chart, unless the welding time is decreased and the welding current or heat is increased, which may somewhat increase the cost of production.

★ ★ ★

4. The Welding Time

As pointed out previously, time is a function of the wire diameters and for good results the values shown in the Welding Data Chart should be used. In foot pedal operated equipment it is possible for the operator to control time, but the best and most consistent results can be secured from a welder equipped with an automatic timer to eliminate the inconsistencies of human judgment. Automatic weld timing can be obtained through the use of motor driven, pneumatic or electronic timing devices.

★ ★ ★

5. The Welding Current

The diameter of the crossed wires to be welded, the present set-down and the time taken to make the weld must all be determined before the

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proper electrical current can be selected. Here again the Welding Data Chart will be found useful in correlating these factors. The welding current selected should always be somewhat less than that that would cause spitting or the expulsion of hot metal in a non-uniform manner. This would spoil the appearance of the joint and welds of less than maximum strength would more than likely result.

★ ★ ★

6. Testing the Welds

Fig. 5 illustrates a type of jig by which tests may be easily and inexpensively made. It will be noted from the drawing that the dimensions of the various parts of the jig will depend upon the wire diameters. This should be given careful consideration if consistent results are to be obtained. Hardened tool steel should be used in the construction of the jig in order that the loads placed upon it will not result in changing the original dimensions, particularly on the edges that press against the wires.

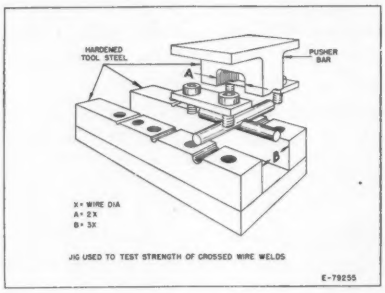

Fig. 5— * * * * * *

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While the force required to break the weld on this type of jig does not represent the tensile strength of the weld, it does provide a method for comparing the relative strength of different welded joints. The analysis and temper of the wires being tested must also be given consideration when comparing the test values recorded with those given in the Welding Data Chart.

★ ★ ★

Conclusion

The three principal requirements for making a resistance crossed-wire weld are that there be the right "amount of heat" in the "right place" for the "right length of time" and there be enough welding force (pressure) to forge the parts together. In

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resistance welding, the term "heat" is generally used as operating slang. The weld is said to be "too hot" or "too cold" and the operator "cuts down the heat" or "raises the heat". The operator changes the heat by use of the voltage tap switch or heat control (in the case of an electronic control).

★ ★ ★

Conclusion

The heat is also affected for other reasons and to help clear up some misunderstanding the following explanations are given:

(A) If the welding current is too high, hot metal squirts or spits out from between the wires being welded and there is too much heat.

(B) If the welding time is too long, hot metal will spit out and there is too much heat.

(C) If the welding force is not built up high enough before the welding current comes on, or if the welding force does not stay on long enough after the welding current has stopped to allow the weld to cool slightly, the effect will be as though the welding force was not high enough. This will cause "burnt" welds and hot metal will "spit out" because there is too much heat for the force being used.

(D) If the electrode contact area is too small or is not correctly shaped to make good contact with the wires the surface of the wires will be pitted and burned. The steel may stick to the electrode and there is "too much heat."

(E) If the electrodes are made of some copper alloy which has too much electrical resistance, it will burn the wires and have the effect of "too much heat".

(F) If the welder is set up for welding certain diameters of wire and then smaller diameters are put into the welder without making any adjustment the weld will be "too hot".

(G) If there is excessive rust, scale, dirt, etc., the surface of the wires gets burned and pitted. The wires stick to the electrodes and the weld is "too hot". In some cases where the coating of rust or scale is quite heavy the current will not be able to pass through the coating and there will be no weld at all.

(H) If the work is of such a type that a big section of magnetic low carbon steel is moved into or near the welder throat as welding progresses the welding current decreases and the weld gets "colder". This is because some of the welder voltage is used to magnetize this steel in the work and so in effect there is less voltage (electrical pressure) to make as much current flow.

For wires of other sizes and metals than are considered here, it is possible to set up similar data in advance of production that a machine operative can follow without dependence upon guess-work.

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Index to Advertisers

A

Acrometal Products Inc. 126
Aetna-Standard Eng'g. Co. 200
Ajax Electric Co., Inc. 185
Ajax Industrial Supplies, Inc. 211
American Chemical Paint Company 176
American Insulating Machinery Company 196
American Steel & Wire Co. 143
American Woodworking Co. 212
Angier Corporation, The 206
Apco Mossberg Company 208
Apex Alkali Products Co. 213

B

Baird Machine Co., The 129
Balloffet-Vianney Wire Die Co., Inc. 211
Bethlehem Steel Company 118
Bick, Hans C., Inc. 214
Boulin, Victor J. 211
Bridge Mfg. Co. 171
Bronze Die Casting Co. 194

C

Carboloy Dept. of General Electric Co. ..... 168 and 169
Carl-Mayer Corp., The 201
Ceilcote Company, The 212
Chase Brass & Copper Co. 132
Chemsteel Construction Co. 212
Cleveland Tramrail Division of the Cleveland Crane & Engineering Co. 130
Cochaud Wire Die Corp. 211
Continental Steel Corporation 210
Cook Mfg. Co., The 202

D

Danforth Co., C. W. 212
Davis Electric Co. 122
Durant Mfg. Co. 198
Durkee Mfg. Co. 207

E

Eastern Carbide Corp. 210
Eisler Engineering Co., Inc. 212
Electric Furnace Company ..... Back Cover
Elgin National Watch Co., Abrasives Div. 131
Emory, Robert J. Company 201
Entwistle, James L., Co. ..... 148 and 181
Erie Iron & Supply Corp. 212

F

Fatigue of Materials Laboratory 214
Federal Mfg. Co., The 182
Fenn Mfg. Co., The 144
Fidelity Machine Co., Inc. 173
Firth-Sterling Steel & Carbide Corp. 117
Fort Wayne Wire Die, Inc. 211

G

Gerber, J. & Co., Inc. 203
Glader, Wm., Machine Works 178
Glass Fibers, Inc. 138

H

Haas-Miller Corp. 199
Harper Electric Furnace Corp. 188
Hartley Tool & Die Company 133
Haskell-Dawes Machine Co., Inc. 205
Haveg Corporation 213
Heil Process Equipment Corp. 213
Holden, A. F. Co., The ..... 158 and 159
Hoosier Wire Die, Inc. 211
Howsam Spool Company 196
Hubbard Spool Company 200
Hughesville Machine & Tool Company 179

I

Imhoff, Wallace G. Co. 214
Indiana Wire Die Company 211
Industrial Ovens, Inc. 213
Interlocking Fence Corp. 192

J

Johnson Steel & Wire Co. 174

K

Kelly Wire Die Corporation 211
Keystone Steel & Wire Company 172
Kilmer, M. D. & Co. 208

L

Lancaster, Allwine & Rommel 214
Lewis, K. B. 214
Lewis Machine Company, The 184
Lundahl Corporation 190

M

Magnus Chemical Co., Inc. 123
Malin & Company, The 210
Marshall-Richards Machine Co., Inc. 119
Mason Can Company 208
McCaskie, Wm., Inc. 209
Metal Carbides Corporation 124
Metal & Thermit Corporation 203
Mettler Machine Tool, Inc. 191
Meyer, Roth & Pastor 186
Micro Products Company 170
Miller, R. H. Co., Inc. 142
Montan Export Inc. 207
Montgomery Co., The 210
Morgan Construction Company 120
Morrison Industries 212
Mossberg Pressed Steel Corp. 193
Murex, Ltd. 183

N

National Machinery Exchange 213
National Research Co. 209
National Rubber Machinery Co. 213
National Waterproof Papers, Inc., Crepe-Kraft Div. 213
New England Butt Company 212
New England Lacquer Co. 205
New England Wire Die Co. 211
Niles Steel Products Div., Republic Steel Corp. 121
Nilson, A. H. Co., The 180
Nopco Chemical Co. 187
Nors-Holm Industries, Inc., Nors-Holm Machine Division 206
North Anson Reel Co. 177
Norton Co., The 202

O

Orban, Kurt Co. 189

P

Pacific Coast Borax Company 204
Parkin Chemical Co., The 213
Pennsylvania Salt Manufacturing Co. 128
Pittsburgh Cut Wire Company 197
Pittsburgh Steel Company 140
Platt Brothers & Co., The 213
Porter, H. K., Inc. 208
Pourtier Freres, Ets. 182

R

Roebling's, John A., Sons Company 125
Rockwell, W. S., Co. 199
Roll-a-Reel 209
Roos Tool & Mfg. Company 204
Royle, John & Sons 175
Rusch Wire Die Corporation 211

S

Scott Testers, Inc. 212
Scudder, E. J. Foundry & Machine Co. 213
Sjogren Tool and Machine Co., Inc. 198
Sleeper & Hartley, Inc. 212
Solar Products Corporation 135
Specialty Wire Co., Inc. 213
Standard Industrial Compounds Co. 127
Standard Machinery Co., The 145
Standard Mill Supply Co. 212
Standard-Toch Co. 136
Steel Equipment Co. 194
Surface Combustion Corp. 212
Syncro Machine Company ..... Front Cover

T

Terkelsen Machine Company 213
Trauwood Engineering Co., The 212

U

United States Steel Corp. 143

V

Vascoloy-Ramet Corporation 146
Vaughn Machinery Company 139

W

Wafios Maschinenfabrik 186
Walde, Leonard O. 214
Warner Company 209
Wartenweiler, Emilio 195
Waterbury Farrel Foundry & Machine Co. 166
Watson Machine Company ..... Inside Back Cover
Wayne Wire Die Co. 211
Wean Equipment Corporation 155
Westinghouse Electric Corp., Industrial Heating Div. 141
Wickwire Brothers, Inc. 207
Wilson, Lee, Engineering Co., Inc. ..... Inside Front Cover
Wire & Textile Machinery, Inc. 207

Y

Youngstown Sheet & Tube Company, The 137

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New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., New York, N.Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Extrusion
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Metal Carbides Corporation, Youngstown, Ohio.
Murex, Ltd., Rainham, England.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Hartley Tool & Die Co., Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hartley Tool & Die Co., Thomaston, Conn.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio.
New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., Allied Products Division, New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Hartley Tool & Die Co., Thomaston, Conn.

WHERE TO BUY, Continued

Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Murex, Ltd., Rainham, England.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIES—Swaging
Murex, Ltd., Rainham, England
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tantalum Carbide
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Murex, Ltd., Rainham, England.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIES—Tungsten Carbide
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Murex, Ltd., Rainham, England.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS & TRAVERSES—Flange Steel
Entwistle, Jas. L. Co., Providence, R. I.
Hubbard Spool Company, Garrett, Indiana
Niles Steel Products Division, Republic Steel Corporation, Niles, Ohio

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., The, Paterson, N. J.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Copper—Leonard D. Walde, North Plainfield, N. J.
Metal Fatigue—Fatigue of Materials Laboratory, Princeton, N. J.
Wire Mill—Lewis, Kenneth B., Worcester, Mass.
Zinc-Imhoff, Wallace G., Co., No. Highlands, Calif.

EQUIPMENT—Insulation Testing
Davis Elec. Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire
Interlocking Fence Co., Morton, Ill.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Company, The, Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Holden, A. F., Co., The, Detroit, Mich.
Morrison Industries, Bedford, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Morrison Industries, Bedford, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Electric
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Rockwell, W. S. Co., Fairfield, Conn.
Trauwood Engineering Co., The, Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, Detroit, Mich.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Pot (oil, gas, electric)
Ajax Electric Co., Inc., Philadelphia, Pa.
Holden, A. F., Co., The, Detroit, Mich.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F. Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Buffalo, N. Y.
Morrison Industries, Bedford, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

GALVANIZING EQUIPMENT—
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOOKS—Pickling & Liming
Bronze Die Casting Co., Pittsburgh, Pa.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

IMPREGNATING MATERIALS—
Standard Toch Chemicals, Inc., New York, N. Y.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Parkin Chemical Company, The, Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
American Insulating Machine Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Glass Fibers, Inc., Toledo, Ohio
Merrimac Paper Co., New York, N. Y.
New England Lacquer Co., E. Providence, R. I.
Owens Corning Fiberglas Corp., Toledo, O.
Solar Products Corp., Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.

INSULATING MATERIALS—Paper—For Electric Wire Cable.
Merrimac Paper Co., New York, N. Y.
Solar Products Corporation, Linden, N. J.

LACQUERS—For Electric Wire
New England Lacquer Co., E. Providence, R. I.
Solar Products Corporation, Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LATHES—Die Reaming
Carboloy Dept. of General Electric Co., Detroit, Mich.
Roos, Tool & Mfg. Co., Montclair, N. J.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

LUMBER—Wire Mill, Carload shipments for lagging and car blocking
North Anson Reel Co., No. Anson, Me.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Barbed Wire
Glader Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Germany
Wean Engineering Co., Cleveland, Ohio.

MACHINERY—Bead Wrapping
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Bolts & Rivets
Meyer, Roth & Pastor Maschinenfabrik, Koln-Raderberg, Germany

MACHINERY—Braiding
Fidelity Machine Co., Inc., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Brazing
Eisler Engineering Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Federal Manufacturing Co., Wallingford, Conn.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

WHERE TO BUY, Continued

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans
(See Machinery—Wind-Up)

MACHINERY—Chain Making
Meyer, Roth & Pastor Maschinenfabrik, Koln-Raderberg, Germany
Nilson, A. H., Machine Co., Bridgeport, Conn.

MACHINERY—Coilers
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Providence, R. I.
Morgan Construction Co., Worcester, Mass.
National Machy. Exch. (used) New York, N. Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Cold Heading
(See Cold Headers)

MACHINERY—Copper Wire Drawing and Rolling
Aetna-Standard Engineering Co., Youngstown, Ohio
American Insulating Mach'y Co., Phila., Pa.
Fenn Manufacturing Co., The, Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
National Mach'y Exch. (Used) New York, N. Y.
Porter, H. K., Inc., Somerville, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Die Making
Carboloy Dept. General Electric Co., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Roos Tool & Mfg. Co., Montclair, N. J.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Dielectric Spark Testers
(See Machinery—Spark Testing)

MACHINERY—Draw Benches
Aetna-Standard Engineering Co., Youngstown, Ohio
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Warterweiler, Emilio, Milano, Italy
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Edging
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Electrode Units
(See Machinery—Spark Testing)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
National Rubber Machinery Co., Akron, Ohio
Royle, John, & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co., Morton, Ill.
Wafios, Maschinenfabrik, Reutlinger, Germany
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Co., The, Hartford, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Stanat Manufacturer Co., Long Island City, N. Y.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Forming Wire
Nilson, A. H., Machine Co., Bridgeport, Conn.

MACHINERY—Galvanizing
(See Galvanizing Equipment)

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Ets. Pourtier Frères, Romainville, France
Fidelity Machine Co., Inc., Philadelphia, Pa.
National Rubber Machinery Co., Akron, Ohio
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Inc., Philadelphia, Pa.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Interlocking Fence Co., Morton, Ill.
Wartenweiler, Emilio, Milano, Italy

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Providence, R. I.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The, Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
Meyer, Roth & Pastor Maschinenfabrik, Koln-Radderberg, Germany
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlinger, Germany
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Youngstown Welding & Engineering Co., Youngstown, Ohio

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.
Meyer, Roth & Pastor Maschinenfabrik, Koln-Radderberg, Germany

MACHINERY—Pointing
Aetna-Standard Engineering Co., Youngstown, Ohio
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.

MACHINERY—Pre-Heater for Wire (for Extrusion of Plastics)
Industrial Ovens, Inc., Cleveland, Ohio
National Rubber Machinery Co., Akron, Ohio

MACHINERY—Re-Spoolers
American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Providence, R. I.
Fidelity Machine Co., Inc., Philadelphia, Pa.
National Mach'y Exch. (Used), New York, N. Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
National Machy. Exch. (used) New York, N. Y.
Stanat Manufacturer Co., Long Island City, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Engineering Co., Cleveland, Ohio

MACHINERY—Rubber Insulating
National Rubber Machinery Co., Akron, Ohio
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
National Rubber Machinery Co., Akron, Ohio
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Spark Testing
Davis Electric Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Providence, R. I.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stanat Manufacturer Co., Long Island City, N. Y.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Spring Making
Carlson Company, The, New York, N. Y.
Lundahl Corp., Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlinger, Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlinger, Germany

MACHINERY—Straightening & Cutting
Fenn Manufacturing Co., The, Hartford, Conn.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
Meyer, Roth & Pastor Maschinenfabrik, Koln-Radderberg, Germany
National Mach'y Exch. (Used), New York, N. Y.
Nors-Hohm Machine Div. of Nors-Hohm Industries, Inc., Rochester, Michigan
Sleeper & Hartley, Inc., Worcester, Mass.
Wartenweiler, Emilio, Milano, Italy
Wean Equipment Corp., Cleveland, Ohio
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Haskell-Dawes Machine Co., Philadelphia, Pa.
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Aetna-Standard Engineering Co., Youngstown, Ohio
Steel Equipment Co., Cleveland, Ohio
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Swaging
Fenn Manufacturing Co., The, Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out Systems
Aetna-Standard Engineering Co., Youngstown, Ohio
Davis Electric Co., Wallingford, Conn.

WHERE TO BUY, Continued

Federal Manufacturing Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio.
Marshall-Richards Machine Co., Inc., Trenton, N.J.
Standard Machinery Co., Mystic, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Ets. Pourtier Frères, Romainville, France
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

MACHINERY—Testing, Physical
Lundahl Corporation, Hartford, Conn.
Scott Testers, Inc., Providenec, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Marshall-Richards Machine Company, Inc., Trenton, N. J.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.
Federal Manufacturing Co., Wallingford, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply, Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Winding Wire
Federal Manufacturing Co., Wallingford, Conn.
Standard Mill Supply, Pawtucket, R. I.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
Kilmer, M. D., & Co., Cleveland, Ohio.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Youngstown, Ohio
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Fenn Manufacturing Co., The, Hartford, Conn.
Kurt Orban Co., Inc., New York, N. Y.
Marshall-Richards Machine Co., Inc., Trenton, N.J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
Kilmer, M. D. & Co., Cleveland, Ohio.
Meyer, Roth & Pastor Maschinenfabrik, Koln-Raderberg, Germany
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlinger, Germany

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N. Y.

MACHINERY—Wrapping Straight Lengths and Tubing
Angier Corporation, The, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Wrapping Wire Coils
Angier Corporation, The, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem, Rolling & Edging
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Co., Cleveland, Ohio.

NAILS—Wire
American Steel & Wire Co., Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling, John A. Sons Co., Trenton, N. J.
Wickwire Brothers, Inc, Cortland, N. Y.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Morrison Industries, Bedford, Ohio
Westinghouse Electric Corp., Industrial Heating Div., Meadville, Pa.

OVENS—Dehydrogenizing
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Industrial
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Rod Bakers
Carl-Mayer Corp., The, Cleveland, Ohio.
Morrison Industries, Bedford, Ohio

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Morrison Industries, Bedford, Ohio

PAINT—Acid Proof
Ceilcote Company, Cleveland, Ohio.
Standard-Toch Chemicals, Inc., New York, N. Y.

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.
Standard-Toch Chemicals, Inc., New York, N. Y.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Angier Corporation, The, Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Angier Corporation, The, Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See Wind-up and Unwind Systems)

PHOSPHATE COATING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Bronze Die Casting Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

PNEUMATIC CYLINDERS—
Entwistle, Jas. L. Co., Providence, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio.

PRESSES—Hydraulic and Mechanical
Standard Machinery Co., Mystic, Conn.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry & Mach. Co., Trenton, N. J.
Siogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

REEL AND TENSION STANDS—
Davis Electric Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Roll-a-Reel, Cincinnati, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Roll-a-Reel, Cincinnati, Ohio
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Drawn Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Indiana

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.

REELS & SPOOLS—Collapsible
Entwistle, Jas. L. Co., Providence, R. I.

REELS & SPOOLS—Plastic
Hubbard Spool Co., Garrett, Indiana

REELS & SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
Mason Can Company, East Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.
North Anson Reel Co., No. Anson, Me.

REELS & SPOOLS—Wooden
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
North Anson Reel Co., No. Anson, Me.
No. Waterford Spool Co., No. Waterford, Me.

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
McCaskie, Inc., Wm., Westport, Mass.
North Anson Reel Co., No. Anson, Me.

REELS—Pay-off
Nors-Holm Industries, Rochester, Mich.

REELS—Takeoff
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
McCaskie, Inc., Wm., Westport, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.
North Anson Reel Co., No. Anson, Me.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio

REELS—Wire Drawing
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Indiana
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

WHERE TO BUY, Continued

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Garrett, Indiana
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.
North Anson Reel Co., No. Anson, Me.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

RESISTANCE HEATING—Annealing Patenting, Etc.
Trauwood Engr. Co., Cleveland, Ohio.

ROD BAKERS—
(See Ovens—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio.
U. S. Steel Co., N. Y., N. Y.

RODS—Wire—Non-Ferrous
American Brass Co., The, Waterbury, Conn.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Erie Iron & Supply Corp., Erie, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Company, Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Montan Export, Inc., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
American Steel & Wire Company, Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's John A., Sons Co., Trenton, N. J

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
(See Compounds—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See Compounds—Rust Preventing)

SALTS—Heat Treating, Descaling, etc.
Holden, A. F., Co., The, Detroit, Mich.
Houghton, E. F. & Co., Philadelphia, Pa.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

SOAPS—Industrial and Wire Drawing
(See Compounds—Wire Drawing)

SODIUM—for Descaling
Holden, A. F., Co., The, Detroit, Mich.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

SPOOLS—(See Reels & Spools)

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Co., East Providence, R. I.

STAMPINGS—Steel
Hubbard Spool Company, Garrett, Indiana
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANKS—Compound
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Ceilcote Company, Cleveland, Ohio.
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.

TANKS—Steel
Chemsteel Construction Co., Pittsburgh, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TINNING PROCESS—
Metal & Thermit Corp., New York, N. Y.

TINSEL—Cords, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL—Electric Resistance
(See: Tinsel—Electric Conductor)

TINSEL—Lame, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Wire
(See: Tinsel—Electric Conductor)

TOOLS—Spring Forming
Lundahl Corporation, Hartford, Conn.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

TUBE BENDERS AND FORMERS—
H. D. Kilmer Co., Cleveland, Ohio.

TURKS HEADS—
Fenn Manufacturing Co., The, Hartford, Conn.

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—for Electric Wire
N. E. Lacquer Co., E. Providence, R. I.
Solar Products Corporation, Linden, N. J.
Standard-Toch Chemicals, Inc., New York, N. Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Entwistle, Jas. L. Co., Providence, R. I.
Federal Manufacturing Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R.I.

WIRE—Alloy
Montan Export, Inc., New York, N. Y.

WIRE—Aluminum
Elmet Division, North American Philips Company, Inc., Lewistown, Maine
Malin & Co., Cleveland, Ohio
Seneca Wire & Manufacturing Co., Fostoria, Ohio

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Erie Iron & Supply Corp., Erie, Pa.
Gerber, J., & Co., Inc., New York, N. Y.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's John A., Sons Co., Trenton, N. J.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Coppered
Gerber, J., & Co., Inc., New York, N. Y.

WIRE—Electric
American Brass Co., The, Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio

WIRE—Flat, Fine
Elmet Division, North American Philips Company, Inc., Lewistown, Maine
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Galvanized
Gerber, J., & Co., Inc., New York, N. Y.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Continental Steel Corp., Kokomo, Ind.
Gerber, J., & Co., Inc., New York, N. Y.
Johnson Steel & Wire Co., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Montan Export, Inc., New York, N. Y.
Newbury Company, The, Boston, Mass.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
U. S. Steel Co., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Cleveland, Ohio
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio
Montan Export, Inc., New York, N. Y.
Newbury Company, The, Boston, Mass.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
Specialty Wire Co., Inc., Worcester, Mass.

WIRE—Nickel Silver and Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.
Chase Brass & Copper Co., Waterbury, Conn.

WIRE—Non-Ferrous to Specifications for Special Purposes
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Cleveland, Ohio
Chase Brass & Copper Co., Waterbury, Conn.
Hudson Wire Co., Ossining, N. Y.
North American Philips Co., Inc., Allied Products Division, New York, N. Y.

WIRE—Oil Tempered
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Spring
American Brass Co., The, Waterbury, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Newbury Company, The, Boston, Mass.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
Specialty Wire Co., Inc., Worcester, Mass.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Firth Sterling Steel & Carbide Co., Pittsburgh, Pa.
Specialty Wire Co., Inc., Worcester, Mass.

WIRE—Steel—Also Coppered and Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Erie Iron & Supply Corp., Erie, Pa.
Gerber, J., & Co., Inc., New York, N. Y.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seneca Wire & Manufacturing Co., Fostoria, Ohio
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Erie Iron & Supply Corp., Erie, Pa.
Pittsburgh Cut Wire Co., Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Tungsten
North American Philips Co., Inc., Allied Products Division, New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Weaving (Non-Ferrous)
American Brass Co., The, Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.

WRAPPING PAPER—Creped
Angier Corporation, The, Framingham, Mass.
Arkell Safety Bag Co., New York, N. Y.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

YARNS & TAPES—
Glass Fibers, Inc., Toledo, Ohio
Owens Corning Fiberglas Corp., Toledo, Ohio

YARN TESTERS—
Scott Testers, Inc., Providence, R. I

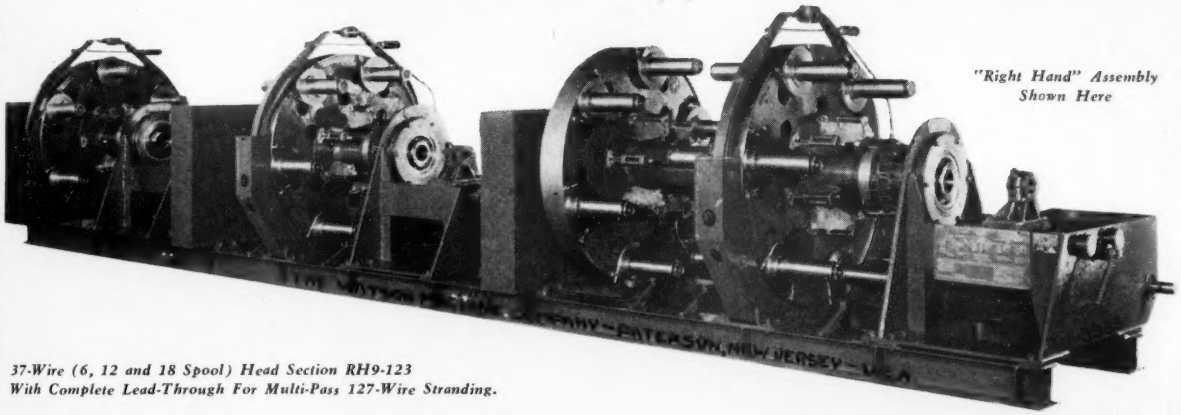
The WATSON MACHINE COMPANY
ESTABLISHED 1845
PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE AND MASTICATING MACHINERY MANUFACTURERS

WATSON

"RH9" STRANDERS

THIS RIGID FRAME HORIZONTAL DESIGN LOADS 22" FLANGE DIA. x 11" TRAVERSE x 5" DIA. BORE STEEL SPOOLS OF 650-LB. COPPER WIRE CAPACITY.



"Right Hand" Assembly Shown Here

37-Wire (6, 12 and 18 Spool) Head Section RH9-123 With Complete Lead-Through For Multi-Pass 127-Wire Stranding.

SUCH STRANDERS, AVAILABLE IN MANY COMBINATIONS, ARE THE MOST ECONOMICAL PRODUCERS OF LARGE SOFT COPPER AND ALUMINUM MULTI-LAYER CONCENTRIC STRANDS OF ROUND AND SECTOR SHAPE.

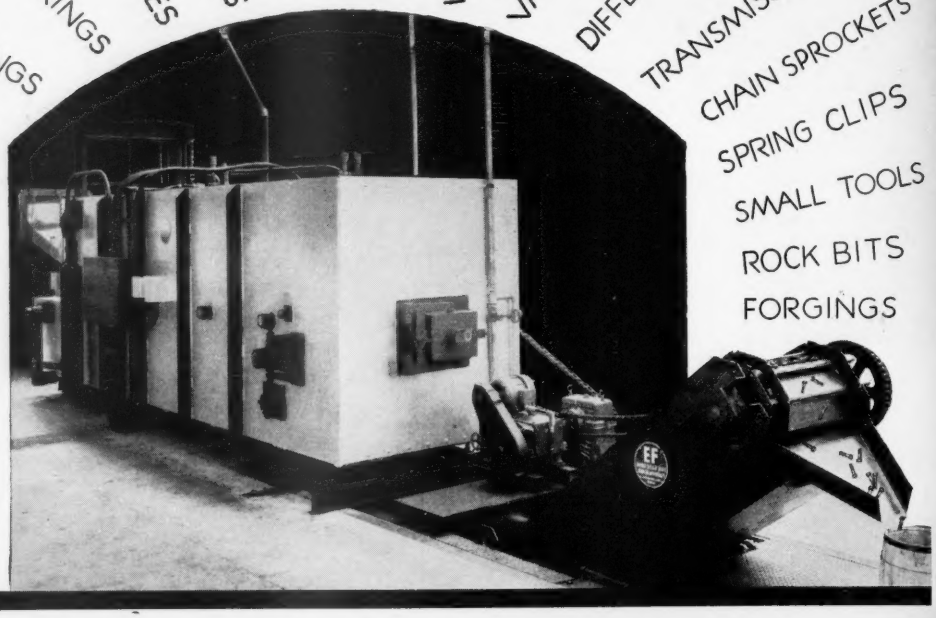
COMPARED WITH PLANETARY MACHINES, THIS TYPE OPERATES AT CONSIDERABLY HIGHER SPEED, IT CAN BE MUCH MORE QUICKLY LOADED, IT REQUIRES MUCH LESS FLOOR SPACE, IT REQUIRES LESS POWER AND IT IS PRACTICALLY MAINTENANCE-FREE. IT IS MUCH LESS EXPENSIVE AND SHOULD BE USED WHERE PLANETARY EQUIPMENT IS NOT ABSOLUTELY NECESSARY.

CONSTRUCTION IS ALL STEEL AND BALL BEARING. HOUSED AND FORCE-FEED LUBRICATED GEARING. COMPLETE LEAD-THROUGH FOR MULTI-PASS STRANDING AND TANDEM ARRANGEMENT WHERE REQUIRED. ROLL-OVER EQUIPMENT ON HEADS FOR PRE-SPIRALED (PREFORMED) SECTOR STRANDS WHERE SPECIFIED.

INQUIRES INVITED — Machine Bulletins on this and other sizes on request.

BALLS FOR BEARINGS
SPRING PLATES
CAP SCREWS
PINIONS
BOLTS - NUTS
RIVETS
WRENCH PARTS
VALVE SPRINGS
DIFFERENTIAL GEARS
TRANSMISSION GEARS
CHAIN SPROCKETS
SPRING CLIPS
SMALL TOOLS
ROCK BITS
FORGINGS
ROLLER BEARINGS
TRACTOR LINKS
AIRCRAFT PARTS
WASHERS
ENGINE PARTS
COIL SPRINGS

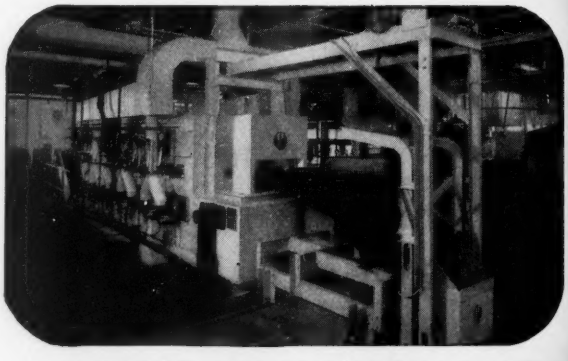
ELECTRIC EF FURNACES FUEL FIRED



For Hardening Small Parts

Uniformly—Scale-free—Continuously 175 to 2000 lbs. per hour

The E F chain belt conveyor furnace is one of the most satisfactory continuous heating units yet devised for scale-free hardening, carbon restoration and non-decarb heat treating small and medium size parts. The material is loaded onto a rugged heat resisting cast link conveyor belt; carried through the furnace; heated uniformly to proper temperature; automatically quenched and discharged. No pans or trays are needed. Hundreds in daily operation prove the dependability and efficiency of our deisgn. 11 standard sizes. Capacities to 2000 lbs. or more per hour. Gas, oil or electrically heated. Furnished complete with any desired feeding or discharging equipment. Write for folders describing our chain belt or other production furnaces.



E F Chain Belt Conveyor Furnace, Radiant Tube Gas Heated, Showing Labor Saving Loading Arrangement
(View at the Top) Electrically Heated Furnace Showing Automatic Quench and Discharge.

EF

Gas-Fired, Oil-Fired and Electric Furnaces
for any Process, Product or Production

THE ELECTRIC FURNACE CO.

WILSON ST. at PENNA. R. R. *Salem - Ohio*